

MSKSEMI 美森科

SEMICONDUCTOR



ESD



TVS



TSS



MOV



GDT



PLED

MSLM324DT

Product specification

GENERAL DESCRIPTION

The MSLM324DT consist of four independent, high gain and internally frequency compensated operational amplifiers. They are specifically designed to operate from a single power supply. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage. Typical applications include transducer amplifiers, DC gain blocks and most conventional operational amplifier circuits.

The MSLM324DT is available in SOP-14 packages.

FEATURES

- Internally Frequency Compensated for Unity Gain
- Large Voltage Gain: 100dB (Typical)
- Low Input Bias Current: 20nA (Typical)
- Low Input Offset Voltage: 2mV (Typical)
- Low Supply Current: 0.5mA (Typical)
- Wide Power Supply Voltage Range:
 - Single Supply: 3V to 36V
 - Dual Supplies: $\pm 1.5V$ to $\pm 18V$
- Input Common Mode Voltage Range Includes Ground
- Large Output Voltage Swing: 0V to $V_{CC} - 1.5V$
- Power Drain Suitable for Battery Operation
- Lead-Free Packages: SOP-14

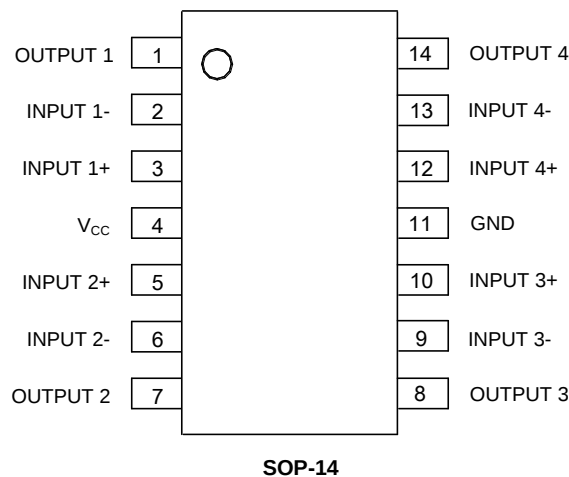
Applications

- Battery Charger
- Cordless Telephone
- Switching Power Supply

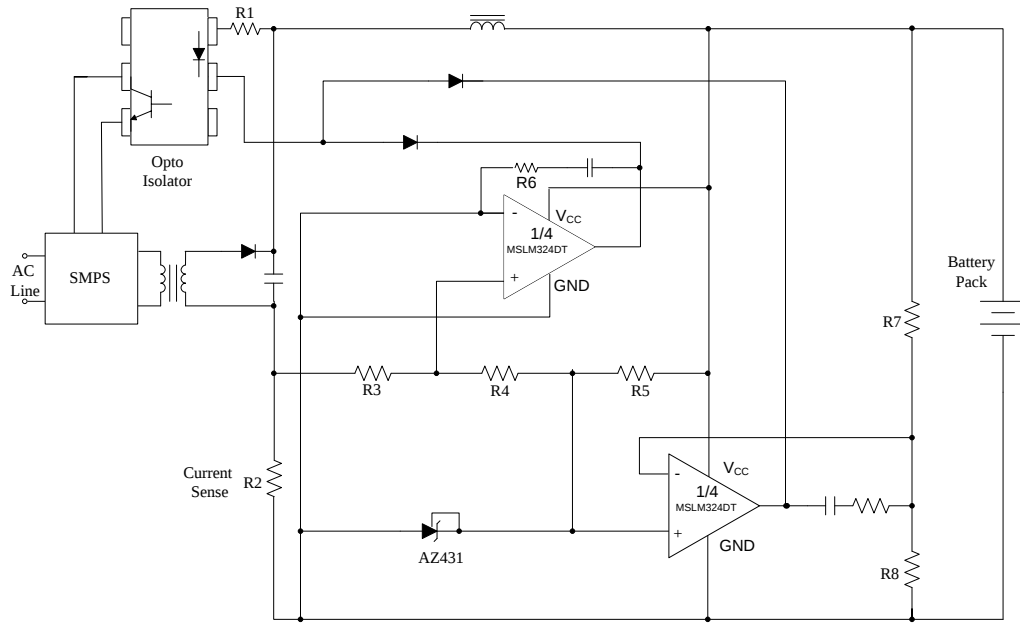
Reference News

Type No	SOP-14	MARKING
MSLM324DT		

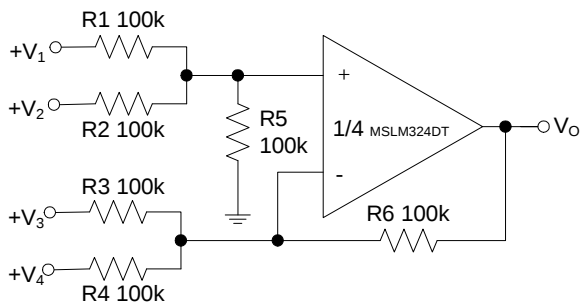
Pin Assignments



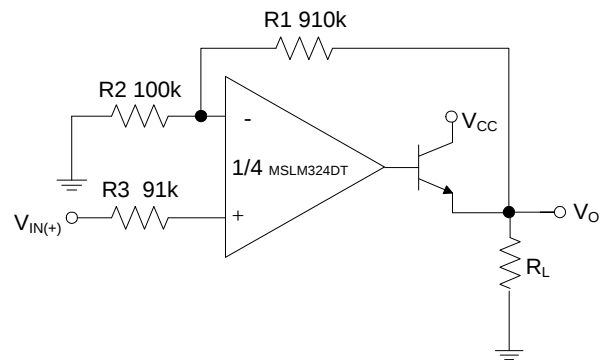
Typical Applications Circuit



Battery Charger

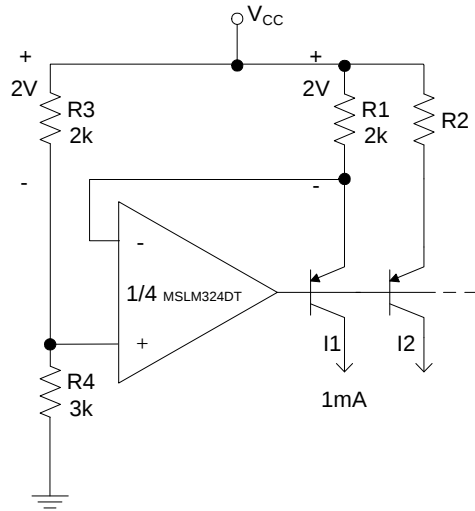


DC Summing Amplifier

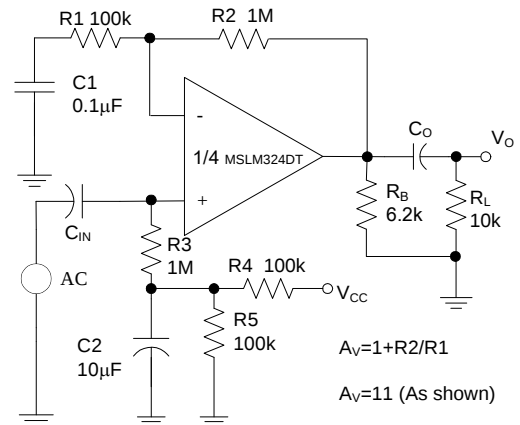


Power Amplifier

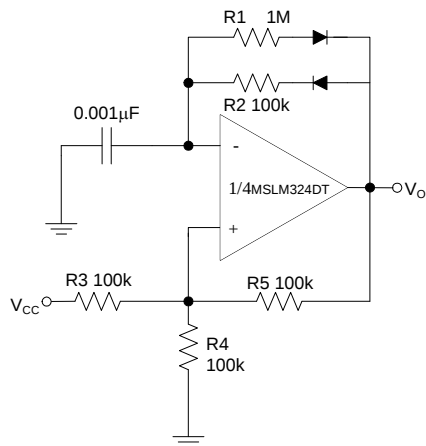
Typical Applications Circuit (continued)



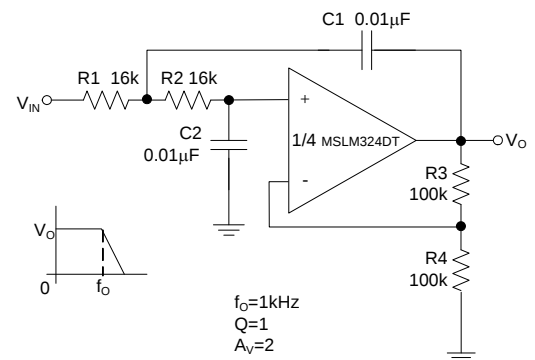
Fixed Current Sources



AC Coupled Non-Inverting Amplifier

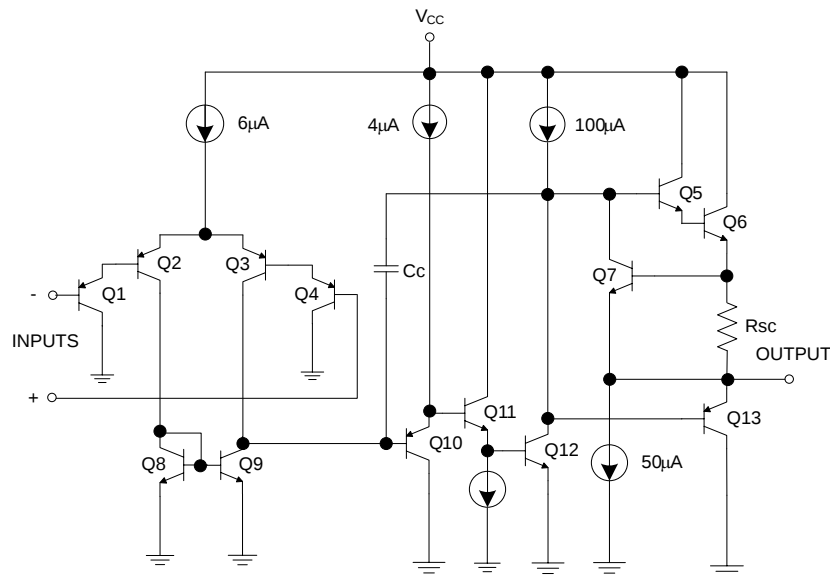


Pulse Generator



DC Coupled Low-Pass RC Active Filter

Functional Block Diagram



Absolute Maximum Ratings (Note 4)

Symbol	Parameter	Rating	Unit
V _{CC}	Supply Voltage	40	V
V _{ID}	Differential Input Voltage	40	V
V _{IN}	Input Voltage	-0.3 to 40	V
P _D	Total Power Dissipation (T _A = +25°C)	800	mW
T _J	Operating Junction Temperature	+150	°C
T _{STG}	Storage Temperature Range	-65 to +150	°C
T _{LEAD}	Lead Temperature (Soldering, 10 Seconds)	+260	°C

Note 4: Stresses greater than those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “Recommended Operating Conditions” is not implied. Exposure to “Absolute Maximum Ratings” for extended periods may affect device reliability.

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V _{CC}	Supply Voltage	3	36	V
T _A	Ambient Operating Temperature Range	-40	+85	°C

Electrical Characteristics (Limits in standard typeface are for $T_A = +25^{\circ}\text{C}$, **bold** typeface applies over $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ (Note 5), $V_{CC} = 5\text{V}$, $\text{GND} = 0\text{V}$, unless otherwise specified.)

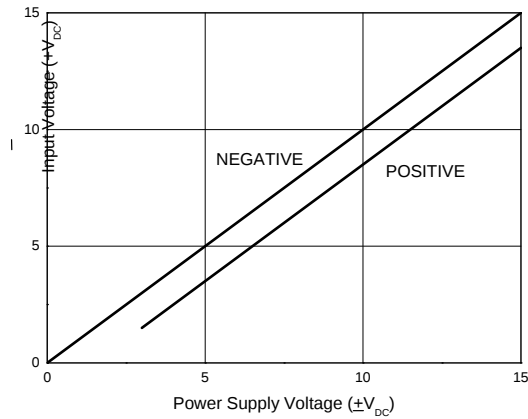
Symbol	Parameter		Conditions	Min	Typ	Max	Unit
V_{IO}	Input Offset Voltage		$V_O = 1.4\text{V}$, $R_S = 0\Omega$, $V_{CC} = 5\text{V}$ to 30V	—	2	5	mV
				—	—	7	
$\Delta V_{IO}/\Delta T$	Average Temperature Coefficient of Input Offset Voltage		$T_A = -40$ to $+85^{\circ}\text{C}$	—	7	—	$\mu\text{V}/^{\circ}\text{C}$
I_{IO}	Input Offset Current		$I_{IN+} - I_{IN-}$, $V_{CM} = 0\text{V}$	—	5	30	nA
				—	—	100	
I_{BIAS}	Input Bias Current		I_{IN+} or I_{IN-} , $V_{CM} = 0\text{V}$	—	20	100	nA
				—	—	200	
V_{IR}	Input Common Mode Voltage Range (Note 6)		$V_{CC} = 30\text{V}$	0	—	$V_{CC} - 1.5$	V
I_{CC}	Supply Current		$T_A = -40$ to $+85^{\circ}\text{C}$, $R_L = \infty$				mA
			$V_{CC} = 30\text{V}$	—	1.0	3	
			$V_{CC} = 5\text{V}$	—	0.7	1.2	
G_v	Large Signal Voltage Gain		$V_{CC} = 15\text{V}$, $R_L \geq 2\text{k}\Omega$, $V_O = 1\text{V}$ to 11V	85	100	—	dB
				80	—	—	
CMRR	Common Mode Rejection Ratio		DC, $V_{CM} = 0$ to $(V_{CC} - 1.5)\text{V}$	60	70	—	dB
				60	—	—	
PSRR	Power Supply Rejection Ratio		$V_{CC} = 5$ to 30V	70	100	—	dB
				60	—	—	
CS	Channel Separation		$f = 1\text{kHz}$ to 20kHz	—	-120	—	dB
I_{SOURCE}	Output Current	Source	$V_{IN+} = 1\text{V}$, $V_{IN-} = 0\text{V}$, $V_{CC} = 15\text{V}$, $V_O = 2\text{V}$	20	40	—	mA
				20	—	—	
I_{SINK}		Sink	$V_{IN+} = 0\text{V}$, $V_{IN-} = 1\text{V}$, $V_{CC} = 15\text{V}$, $V_O = 2\text{V}$	10	15	—	mA
				5	—	—	
			$V_{IN+} = 0\text{V}$, $V_{IN-} = 1\text{V}$, $V_{CC} = 15\text{V}$, $V_O = 0.2\text{V}$	12	50	—	μA
I_{SC}	Output Short Circuit Current to Ground		$V_{CC} = 15\text{V}$	—	40	60	mA
V_{OH}	Output Voltage Swing		$V_{CC} = 30\text{V}$, $R_L = 2\text{k}\Omega$	26	—	—	V
				26	—	—	
			$V_{CC} = 30\text{V}$, $R_L = 10\text{k}\Omega$	27	28	—	
				27	—	—	
V_{OL}			$V_{CC} = 5\text{V}$, $R_L = 10\text{k}\Omega$	—	5	20	mV
				—	—	30	
θ_{JC}	Thermal Resistance (Junction to Case)		SOP-14	—	18	—	$^{\circ}\text{C}/\text{W}$
θ_{JA}	Thermal Resistance (Junction to Ambient)		SOP-14	—	91	—	$^{\circ}\text{C}/\text{W}$

Notes: 1. Limits over the full temperature are guaranteed by design, but not tested in production.

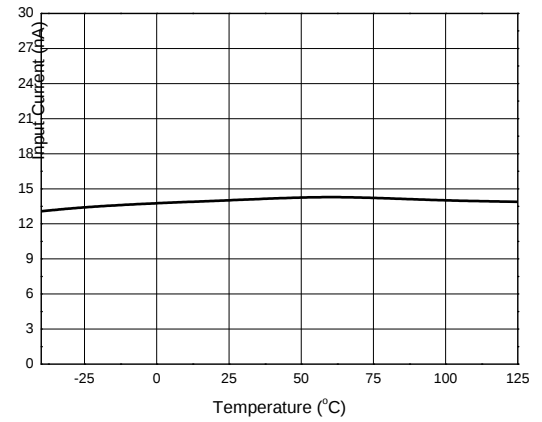
2. The input common-mode voltage of either input signal voltage should not be allowed to go negatively by more than 0.3V (at $+25^{\circ}\text{C}$). The upper end of the common-mode voltage range is $V_{CC} - 1.5\text{V}$ (at $+25^{\circ}\text{C}$), but either or both inputs can go to $+36\text{V}$ without damages, independent of the magnitude of the V_{CC} .

Performance Characteristics

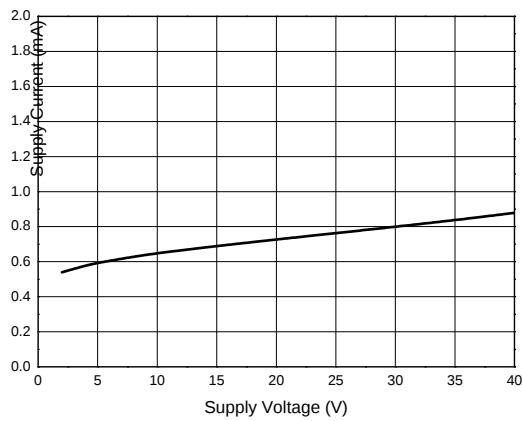
Input Voltage Range



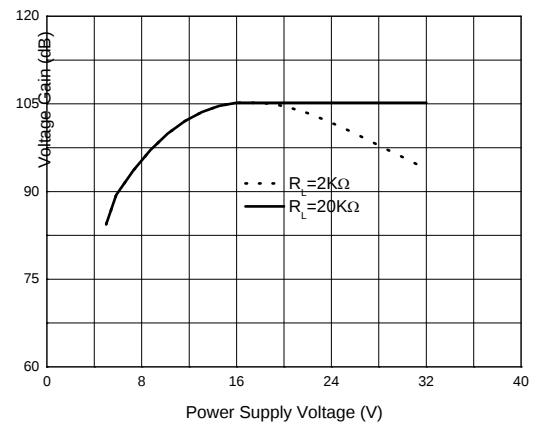
Input Current



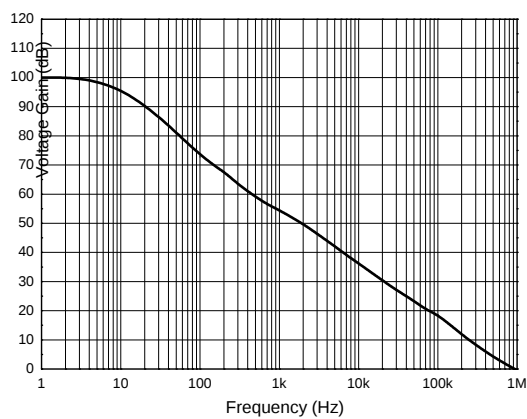
Supply Current



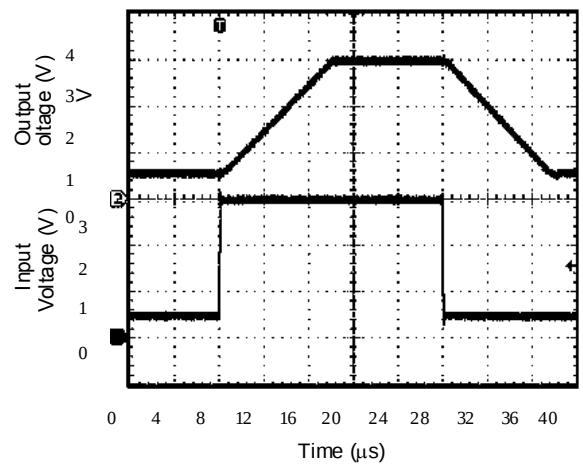
Voltage Gain



Open Loop Frequency Response

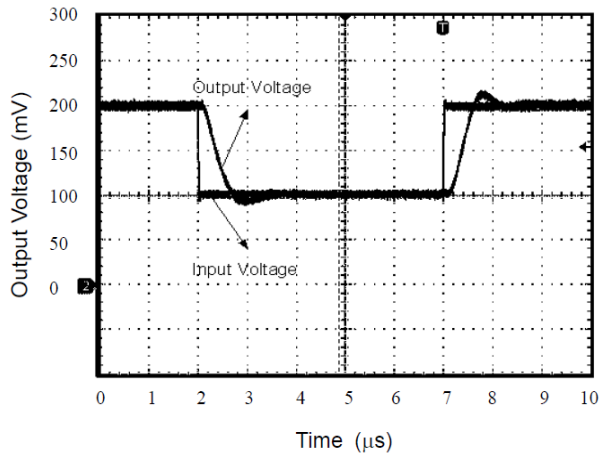


Voltage Follower Pulse Response

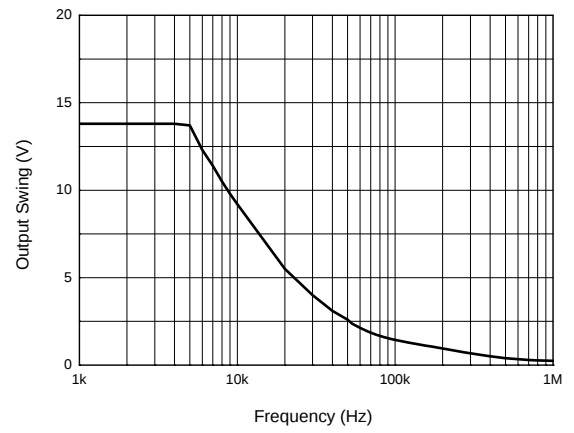


Performance Characteristics (continued)

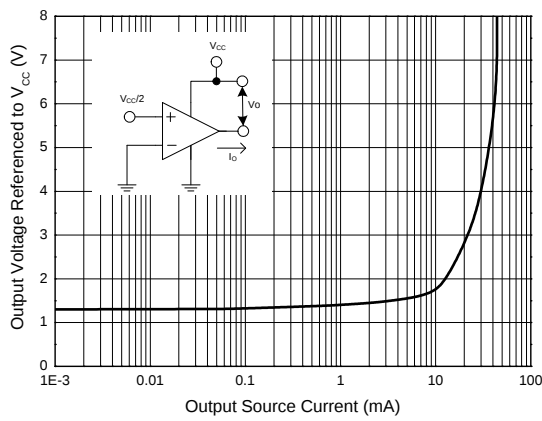
Voltage Follower Pulse Response (Small Signal)



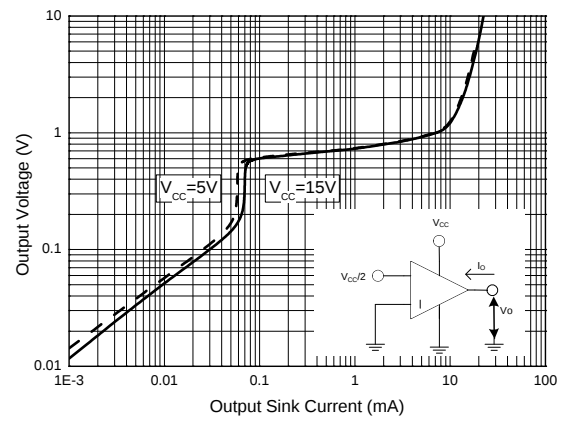
Large Signal Frequency Response



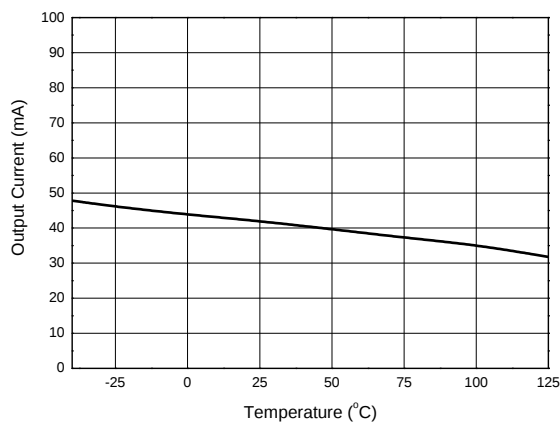
Output Characteristics: Current Sourcing



Output Characteristics: Current Sinking

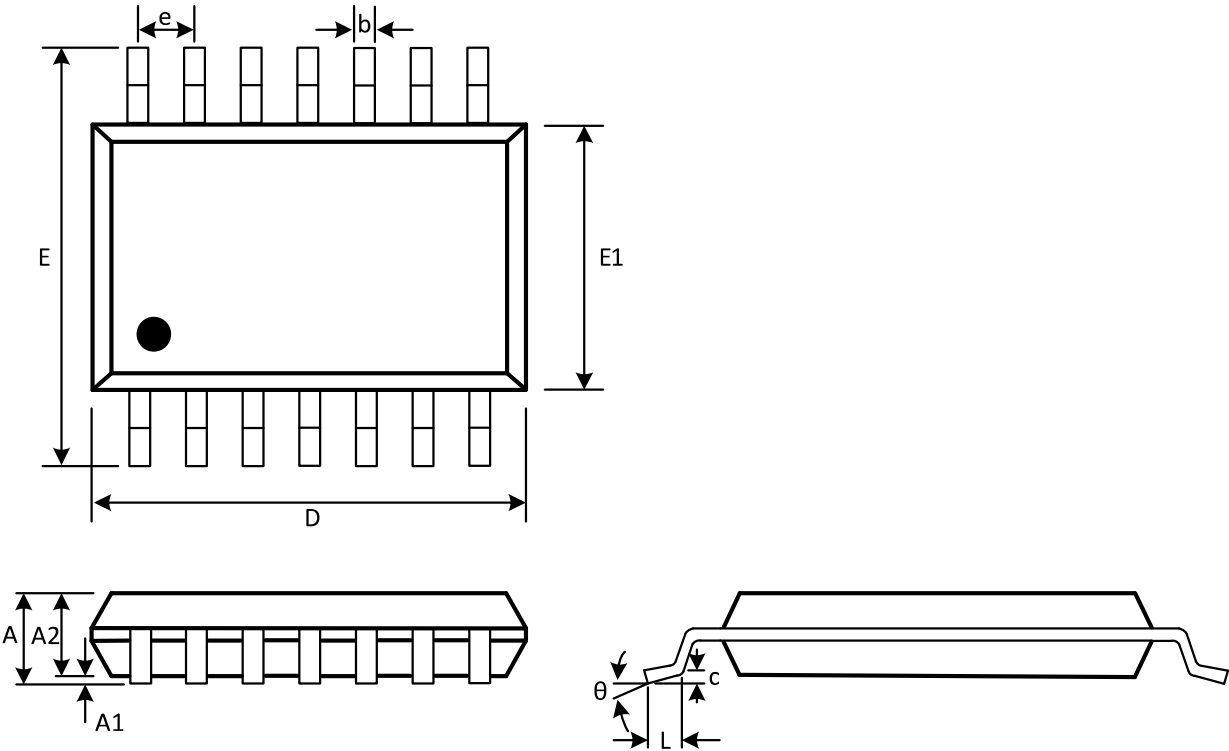


Current Limiting



PACKAGE DESCRIPTION

SOP-14



(Unit: mm)

Symbol	Min	Max
A	1.350	1.750
A1	0.100	0.250
A2	1.350	1.550
b	0.310	0.510
c	0.100	0.250
D	8.450	8.850
e	1.270(BSC)	
E	5.800	6.200
E1	3.800	4.000
L	0.400	1.270
θ	0°	8°

REEL SPECIFICATION

P/N	PKG	QTY
MSLM324DT)	SOP-14	2500

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