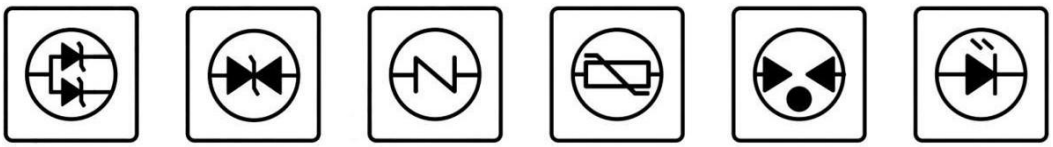
MSKSEMI 美森科
SEMICONDUCTOR



MSLM2904DR

Product specification

GENERAL DESCRIPTION

The MSLM2904DR consists of two independent, high gain and internally frequency compensated operational amplifiers, they are specifically designed to operate from a single power supply. Operation from split power supply is also possible and the low power supply current drain is independent of the magnitude of the power supply voltages. Typical applications include transducer amplifiers, DC gain blocks and most conventional operational amplifier circuits.

The MSLM2904DR is available in SOP-8 package.

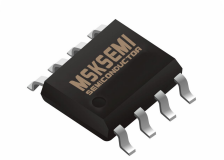
FEATURES

- 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:
  Single Supply: 3V to 36V
  Dual Supplies: ±1.5V to ±18V
- Input Common Mode Voltage Range Includes Ground
- Large Output Voltage Swing: 0V to V_{CC}-1.5V
- Lead-Free Packages: SOP-8

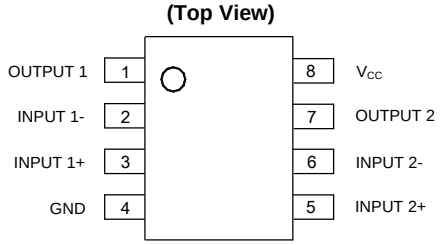
Applications

- Battery Charger
- Cordless Telephone
- Switching Power Supply

Reference News

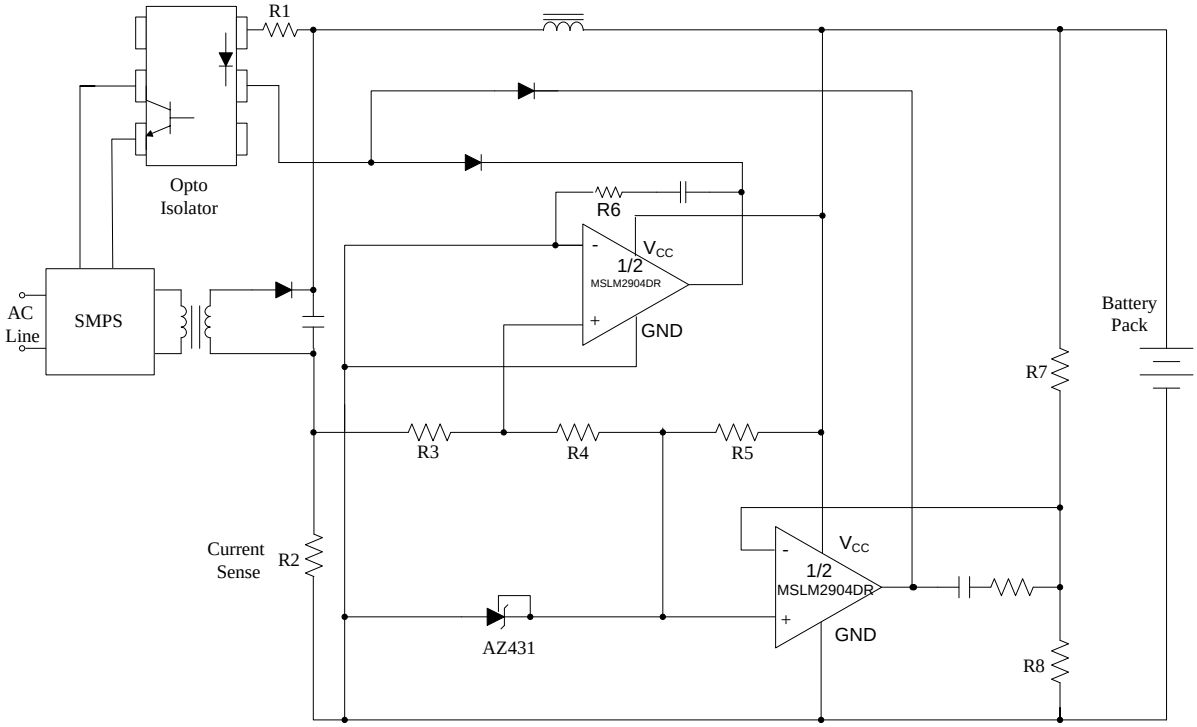
Type No	SOP-8	MARKING
MSLM2904DR		

Pin Assignments

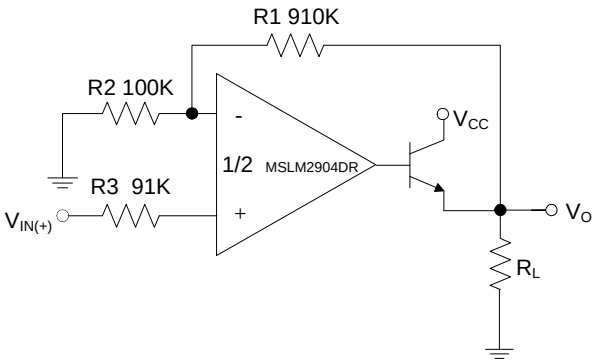


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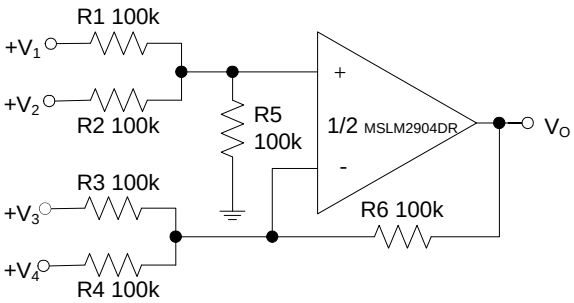
Typical Applications Circuit



Battery Charger

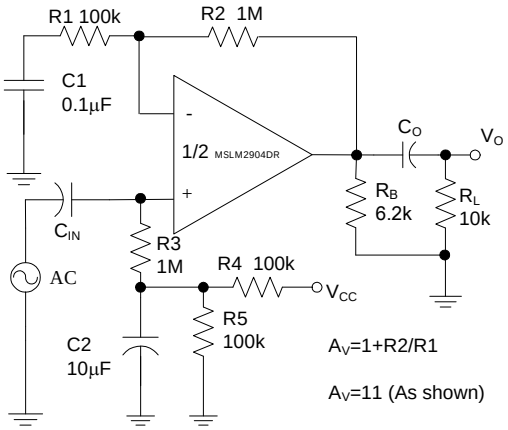


Power Amplifier

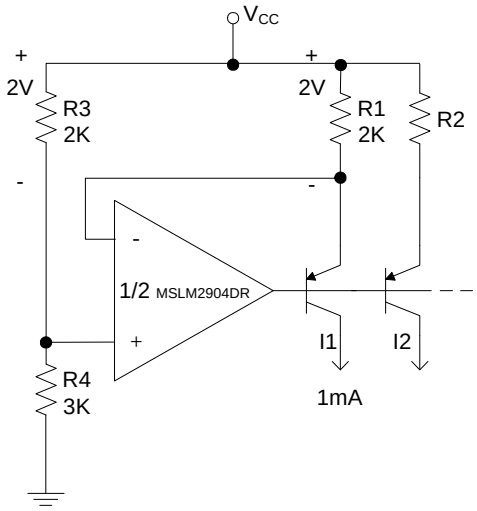


DC Summing Amplifier

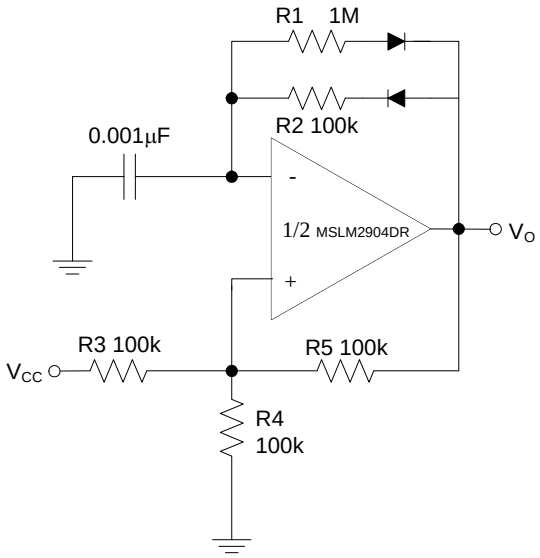
Typical Applications Circuit (Cont.)



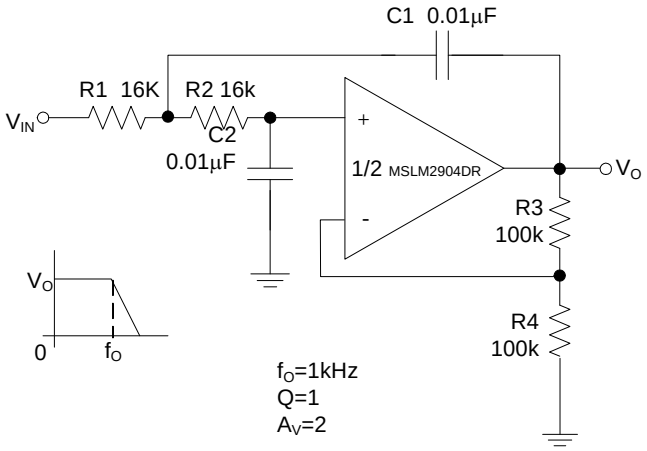
AC Coupled Non-Inverting Amplifier



Fixed Current Sources



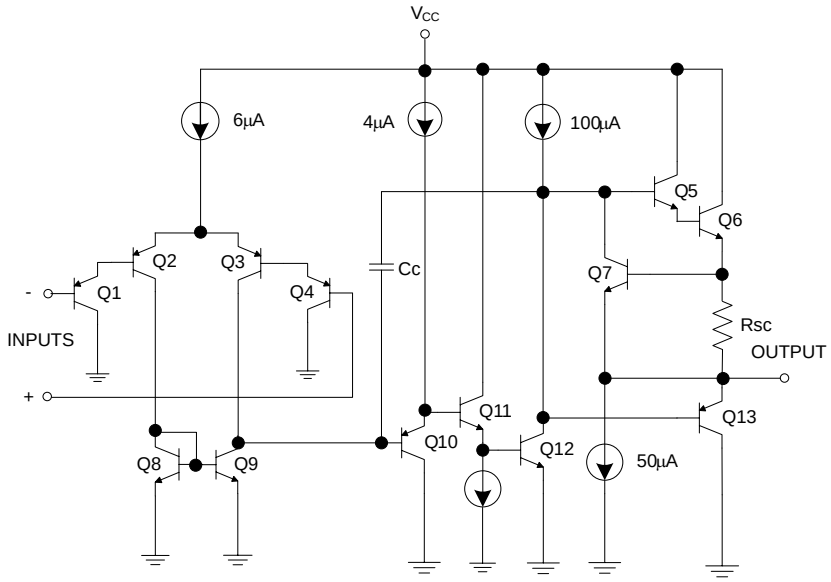
Pulse Generator



DC Coupled Low-Pass Active Filter

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Functional Block Diagram



Absolute Maximum Ratings (Notes 1 & 2)

Symbol	Parameter	Rating	Unit
V_{CC}	Power Supply Voltage	40	V
V_{ID}	Differential Input Voltage	40	V
V_{IC}	Input Voltage	-0.3 to 40	V
P_D	Power Dissipation (T_A = +25°C)	550	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

Notes: 1. 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.

2. ESD sensitivity.

Recommended Operating Conditions

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

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Electrical Characteristics (Limits in standard typeface are for T_A = +25°C, bold typeface applies over -40°C to +85°C (Note 6), V_{CC} = 5V, GND = 0V, unless otherwise specified.)

Symbol	Parameter		Conditions	Min	Typ	Max	Unit
V_{IO}	Input Offset Voltage		V_O = 1.4V, R_S = 0Ω, V_{CC} = 5V to 30V	—	2	5	mV
				—	—	7	
$\Delta V_{IO}/\Delta T$	Average Temperature Coefficient of Input Offset Voltage		T_A = -40°C to +85°C	—	7	—	μV/°C
I_{BIAS}	Input Bias Current		I_{IN}+ or I_{IN}-, V_{CM} = 0V	—	20	200	nA
				—	—	200	
I_{IO}	Input Offset Current		I_{IN}+ - I_{IN}-, V_{CM} = 0V	—	5	30	nA
				—	—	100	
V_{IR}	Input Common Mode Voltage Range (Note 2)		V_{CC} = 30V	0	—	V_{CC} - 1.5	V
I_{CC}	Supply Current		T_A = -40°C to +85°C, R_L = ∞, V_{CC} = 30V	—	0.7	2	mA
			T_A = -40°C to +85°C, R_L = ∞, V_{CC} = 5V	—	0.5	1.2	
G_V	Large Signal Voltage Gain		V_{CC} = 15V, V_O = 1V to 11V, R_L ≥ 2kΩ	85	100	—	dB
				80	—	—	
CMRR	Common Mode Rejection Ratio		DC, V_{CM} = 0V to (V_{CC}-1.5)V	60	70	—	dB
				60	—	—	
PSRR	Power Supply Rejection Ratio		V_{CC} = 5V to 30V	70	100	—	dB
				60	—	—	
CS	Channel Separation		f = 1kHz to 20kHz	—	-120	—	dB
I_{SOURCE}	Output Current	Source	V_{IN}+ = 1V, V_{IN}- = 0V, V_{CC} = 15V, V_O = 2V	20	40	—	mA
				20	—	—	
I_{SINK}		Sink	V_{IN}+ = 0V, V_{IN}- = 1V, V_{CC} = 15V, V_O = 2V	10	15	—	mA
				5	—	—	
			V_{IN}+ = 0V, V_{IN}- = 1V, V_{CC} = 15V, V_O = 0.2V	12	50	—	μA
I_{SC}	Output Short Circuit Current to Ground		V_{CC} = 15V	—	40	60	mA
V_{OH}	Output Voltage Swing		V_{CC} = 30V, R_L = 2kΩ	26	—	—	V
				26	—	—	
			V_{CC} = 30V, R_L = 10kΩ	27	28	—	
				27	—	—	
V_{OL}			V_{CC} = 5V, R_L = 10kΩ	—	5	20	mV
				—	—	30	
θ_{JC}	Thermal Resistance (Junction to Case)			—	17	—	°C/W
θ_{JA}	Thermal Resistance (Junction to Ambient)			—	115	—	

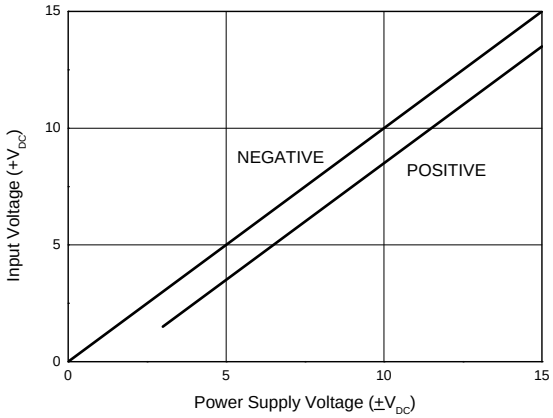
Notes: 1. Limits over the full temperature are guaranteed by design, but not tested in production.

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°C). The upper end of the common-mode voltage range is V_{CC}-1.5V (at +25°C), but either or both inputs can go to +36V without damages, independent of the magnitude of the V_{CC}.

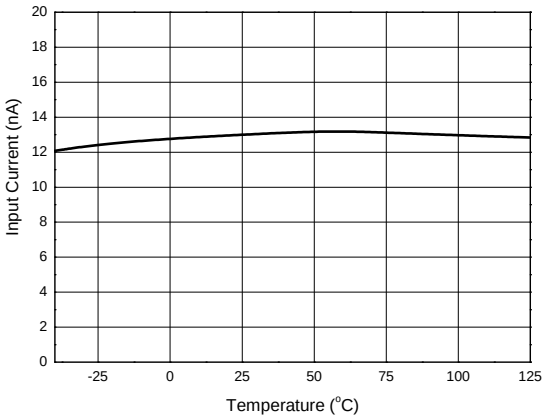
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Performance Characteristics

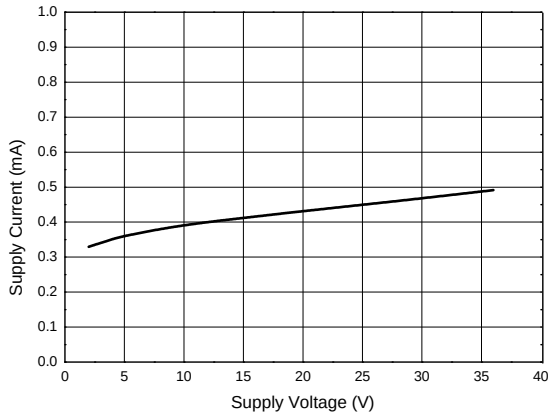
Input Voltage Range



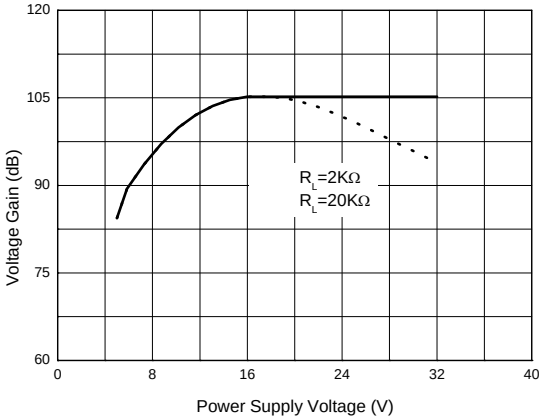
Input Current



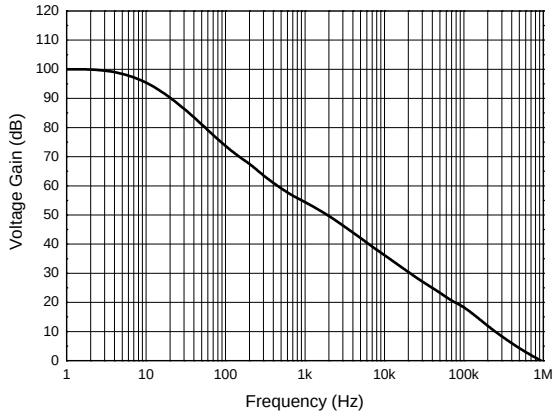
Supply Current



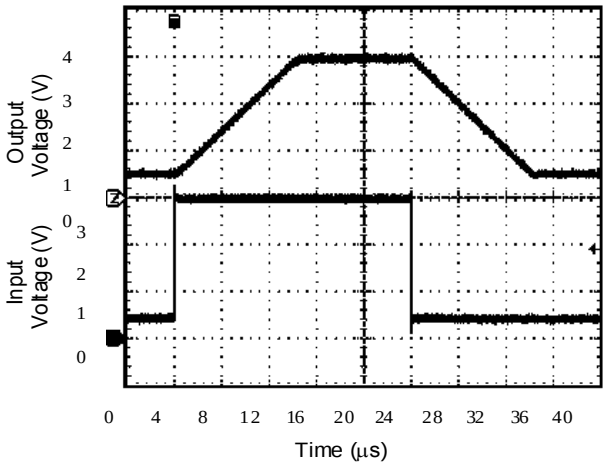
Voltage Gain



Open Loop Frequency Response



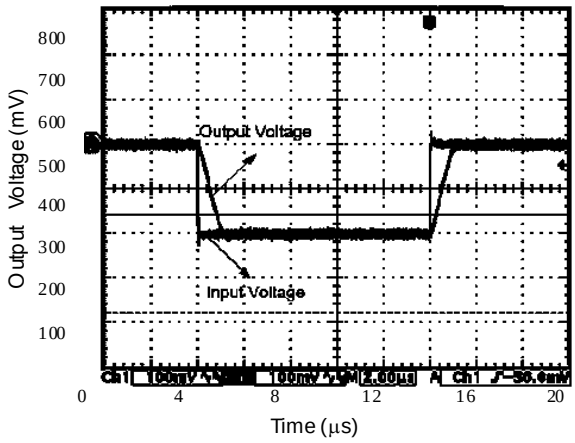
Voltage Follower Pulse Response



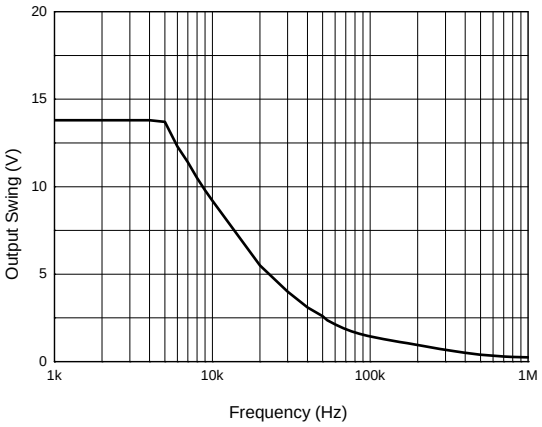
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Performance Characteristics (Cont.)

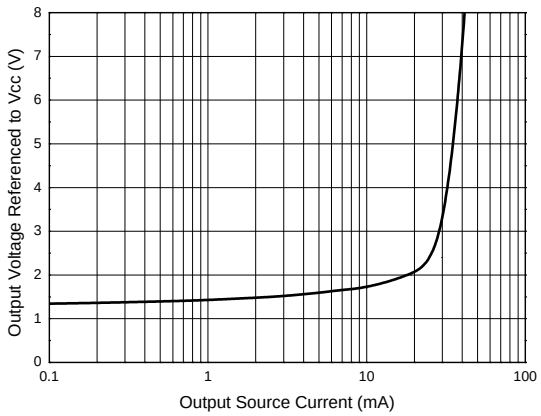
Voltage Follower Pulse Response (Small Signal)



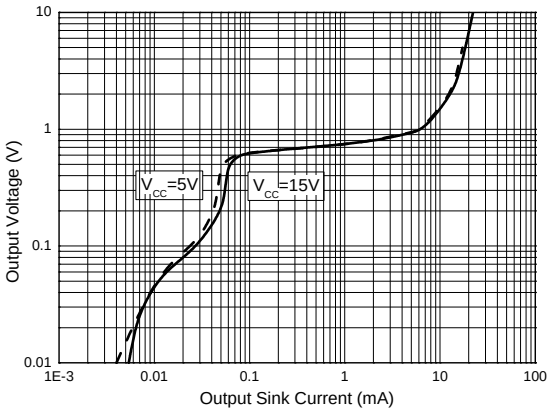
Large Signal Frequency Response



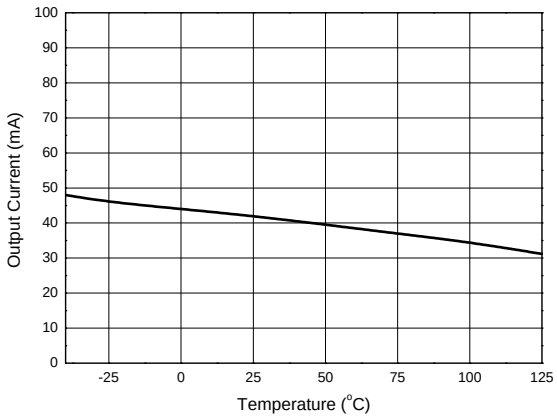
Output Characteristics: Current Sourcing



Output Characteristics: Current Sinking



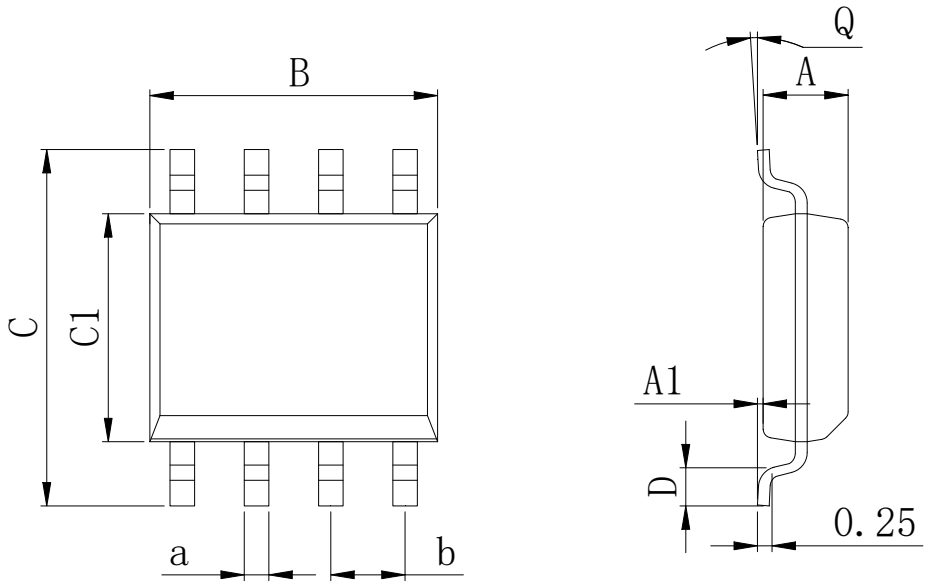
Current Limiting



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Physical Dimensions

SOP-8



Dimensions In Millimeters(SOP-8)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	1.35	0.05	4.90	5.80	3.80	0.40	0°	0.35	1.27 BSC
Max:	1.55	0.20	5.10	6.20	4.00	0.80	8°	0.45	

ORDER INFORMATION

P/N	PKG	QTY
MSLM2904DR	SOP-8	2500

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