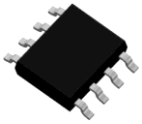
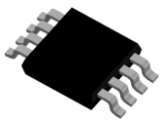
WS742904

1.5MHz Low-Power 28V Operational Amplifiers

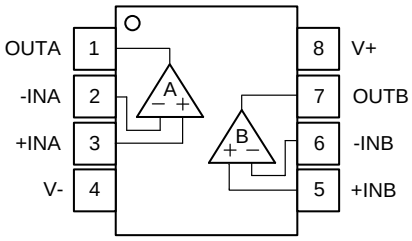
Http//:www.willsemi.com



SOP-8L



MSOP-8L



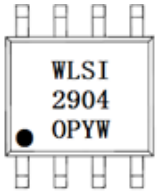
SOP-8L/MSOP-8L

Pin configuration (Top view)

Descriptions

WS742904 consist of dual channel independent, high gain, internally frequency compensated operational amplifiers which are designed specifically to operate from a single power supply over a wide range of voltages. These devices are particularly useful in interface circuits with digital systems and can be operated from the single common 5VDC power supply.

The WS742904 is available in 8-pin SOP and MSOP packages. Standard products are Pb-Free and halogen-Free.



SOP-8L

MSOP-8L

Marking

2904 = Device code

OP = Special code

GM = Special code

Y = Year code

W = Week code

Features

- Single Supply Voltage : 3~28V
- Quiescent Current per Amp : 100μA Typical
- GBWP : 1.5MHz
- Slew Rate : 1.2V/μs
- Offset Voltage : 2mV Maximum
- Offset Voltage Temp. Drift : 2.7μV / ℃
- EMIRR IN+ : >80dB@1GHz
- CMRR/PSRR/Gain : 120/130/115dB
- Output Short-Circuit Curr. : 20mA
- Input Common-Mode Voltage Range Includes Ground
- No Output Crossover Distortion
- No Phase Reversal from Overdriven Input
- Rail-to-Rail Output Swing
- -40℃ to 125℃ Operation Range

Applications

- Walkie-Talkie
- Battery Management Solution
- Transducer Amplifiers
- Summing Amplifier
- Multivibrators
- Oscillators
- DC Gain Blocks

Order Information

Device	Package	Shipping
WS742904S-8/TR	SOP-8L	4000/Reel &Tape
WS742904M-8/TR	MSOP-8L	4000/Reel &Tape

Pin Descriptions

Pin Number	Symbol	Descriptions
1	OUTA	Output
2	-INA	Inverting input
3	+INA	Non-inverting input
4	V-	Negative supply
5	+INB	Non-inverting input
6	-INB	Inverting input
7	OUTB	Output
8	V+	Positive supply

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage, ([V+] – [V-])	V_S (2)	32	V
Input Differential Voltage	V_{IDR} (3)	±32	V
Input Common Mode Voltage Range	V_{ICR}	V^- to V^+-2	V
Output Short-Circuit Duration	t_{SO}	Unlimited	/
Operating Fee-Air Temperature Range	T_A	-40 to 125	°C
Storage Temperature Range	T_{STG}	-65 to 150	°C
Junction Temperature Range	T_J	150	°C
Lead Temperature Range	T_L	260	°C

Note:

1. Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are only stress ratings, and functional operation of the device at these or any other conditions beyond those indicated under recommended operating conditions are not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
2. All voltage values, except differential voltage are with respect to network terminal.
3. Differential voltages are at +IN with respect to –IN.

ESD, Electrostatic Discharge Protection

Symbol	Parameter	Condition	Minimum level	Unit
HBM	Human Body Model ESD	MIL-STD-883H Method 3015.8 JEDEC-EIA/JESD22-A114A	±2500	V
MM	Machine Model ESD	JEDEC-EIA/JESD22-A115	±350	V
CDM	Charged Device Model ESD	JEDEC-EIA/JESD22-C101E	±2000	V

Electronics Characteristics

The ***** denotes the specifications which apply over the full operating temperature range, otherwise specifications are at T_A = 25°C. V_S = 5V, V_{CM} = V_{OUT} = V_S/2, R_{load} = 2kΩ, C_{load} =100pF.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_{OS}	Input Offset Voltage	V_{CM}= V_S/2	*	-2.0	±0.1	2.0	mV
α_{VOS}	Input Offset Voltage Drift				2.7		μV/°C
I_{IB}	Input Bias Current				20		pA
I_{OS}	Input Offset Current				20		pA
V_n	Input Voltage Noise	f=0.1Hz to10Hz			6		μV_{P-P}
e_n	Input Voltage Noise Density	f=1kHz			38		nV/√Hz
		f=10kHz			27		
CMRR	Common Mode Rejection Ratio	DC, V_S=28V, V_{CM}=0V to 26V	*	105	120		dB
V_{CM}	Common Mode Input Voltage Range	V_S=5V to 28V	*	V^-		V^+-2	V
PSRR	Power Supply Rejection Ratio	V_S=5V to 28V	*	115	130		dB
A_{VOL}	Open Loop Large Signal Gain	V_S=5V, V_{OUT}=0.1V to 4.9V, R_{load}=2kΩ	*	90	95		dB
		V_S=15V, V_{OUT}=1V to 14V, R_{load}=10kΩ	*	105	120		
V_{OH}	High Level Output Voltage	R_{load}=2kΩ			14.20		V
		R_{load}=10kΩ			14.85		
V_{OL}	Low Level Output Voltage	R_{load}=2kΩ			-14.55		V
		R_{load}=10kΩ			-14.90		
I_{SC}	Output Short-Circuit Current	Source Current, V_S=28V	*	18	20		mA
		Sink Current, V_S=28V	*	18	22		
I_Q	Quiescent Current per Amplifier	V_S=5V, No Load	*		100	115	μA
		V_S=28V, No Load	*		120	145	
PM	Phase Margin	R_{load}=2kΩ, C_{load}=100pF			67		degrees
GM	Gain Margin	R_{load}=2kΩ, C_{load}=100pF			-15		dB
GBWP	Gain-Bandwidth Product	f=1kHz			1.5		MHz
t_S	Settling Time	A_V=1, V_{OUT}=1V, 0.1%			2.2		μs
SR	Slew Rate	A_V=1, V_S=±14V, V_{OUT}=-10V to 10V, R_{load}=10kΩ, C_{load}=100pF			1.2		V/μs
FPBW	Full Power Bandwidth				38		kHz
THD+N	Total Harmonic Distortion and Noise	f=1kHz, AV=1, R_{load}=2kΩ, V_{OUT}=2V_{PP}			-97		dB
X_{talk}	Channel Separation	f=1kHz			115		dB

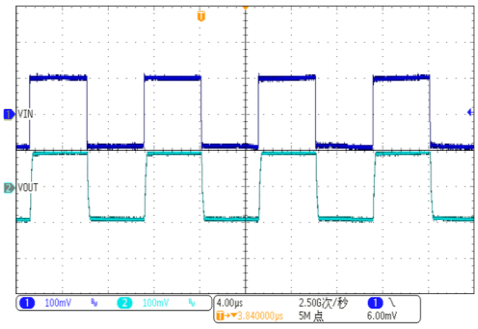
Note:

1. Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. Exposure to any Absolute Maximum Rating condition for extended periods may affect device reliability and lifetime.
2. A heat sink may be required to keep the junction temperature below the absolute maximum rating when the output is shorted indefinitely.
3. Thermal resistance varies with the amount of PC board metal connected to the package. The specified values are for short traces connected to the leads.
4. Full power bandwidth is calculated from the slew rate FPBW = SR/($\pi \bullet V_{P-P}$).

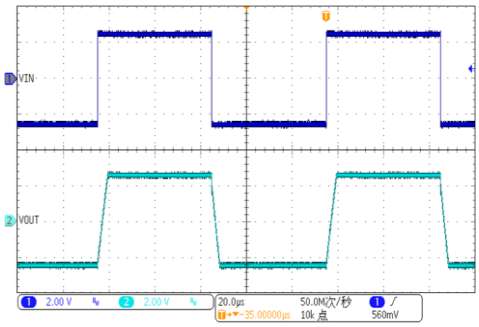
Typical Characteristics

T_A=25℃, V_S=±14V, V_{CM}=0V, R_{load}=Open, unless otherwise noted

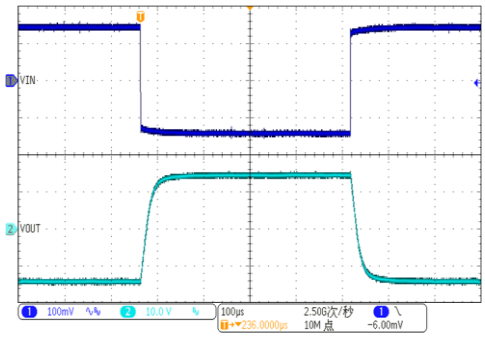
Small-Siganl Step Response, 100mV Step



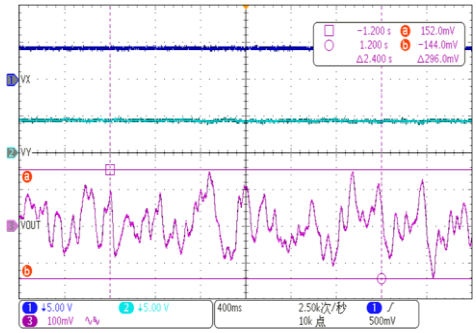
Large-Siganl Step Response, 2V Step



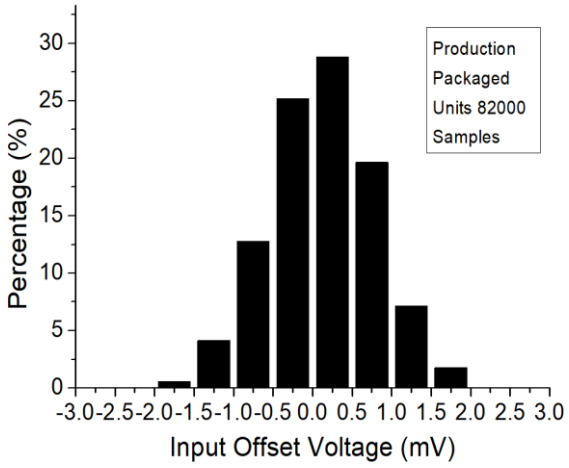
Negative/Positive Over-Voltage Recovery



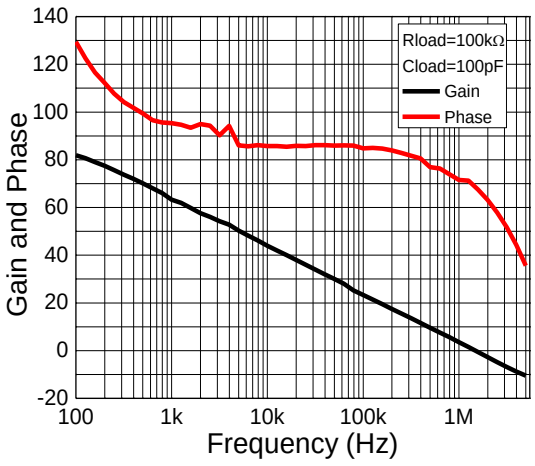
0.1Hz to 10Hz Integrated Input Noise, Gain = 50000



Input Offset Voltage Distribution



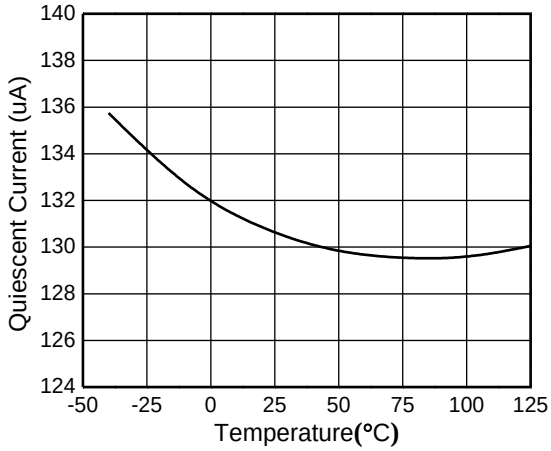
Open-Loop Gain and Phase



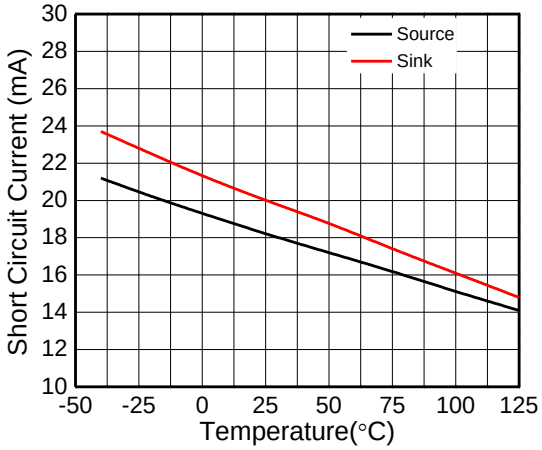
Typical Characteristics (continued)

T_A=25℃, V_S=±14V, V_{CM}=0V, R_{load}=Open, unless otherwise noted

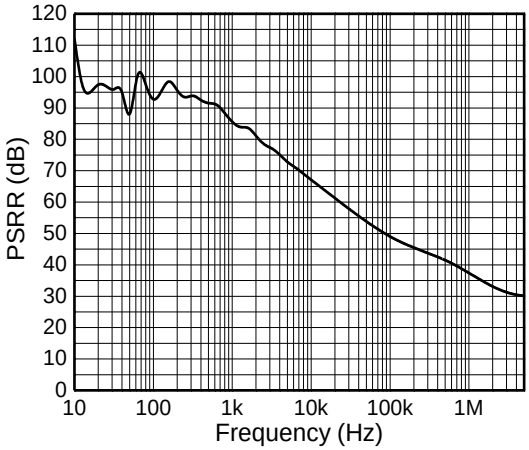
Quiescent Supply Current vs. Temperature



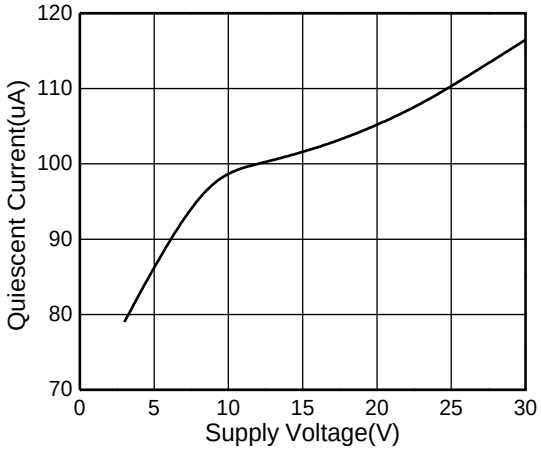
Short-Circuit Current vs. Temperature



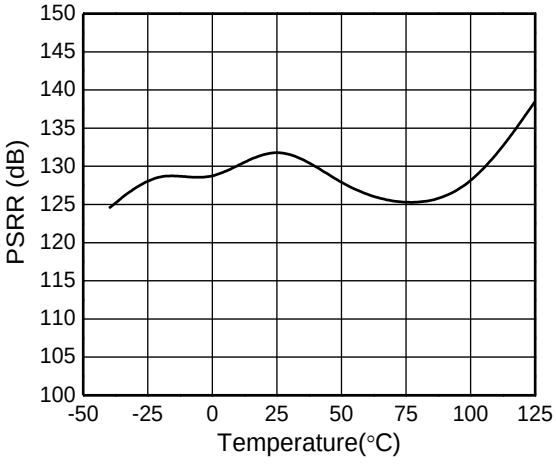
PSRR vs. Frequency



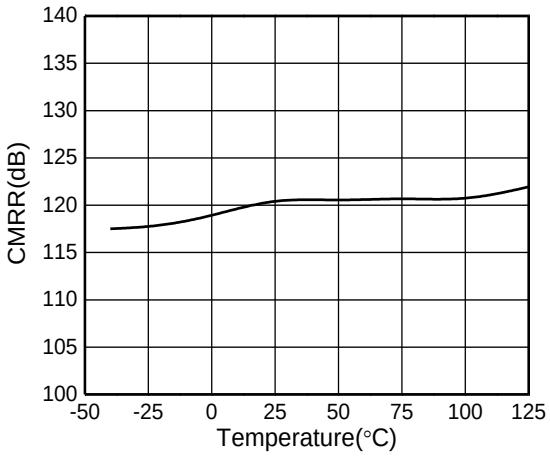
Quiescent Supply Current vs. Supply Voltage



PSRR vs. Temperature



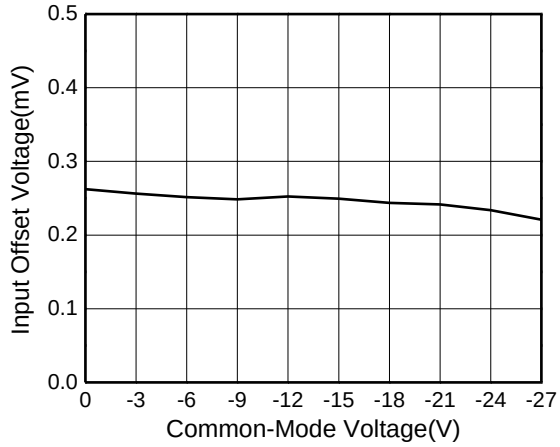
CMRR vs. Temperature



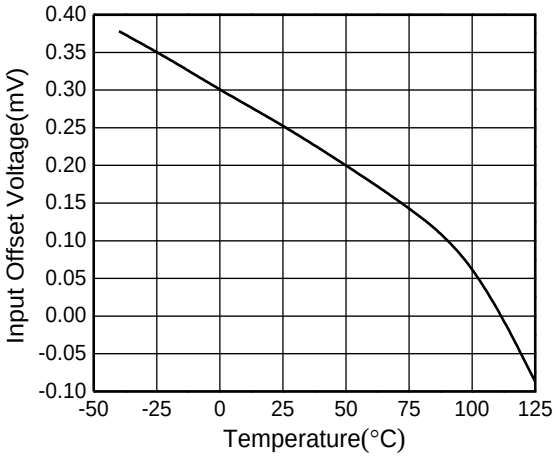
Typical Characteristics (continued)

T_A=25℃, V_S=±14V, V_{CM}=0V, R_{load}=Open, unless otherwise noted

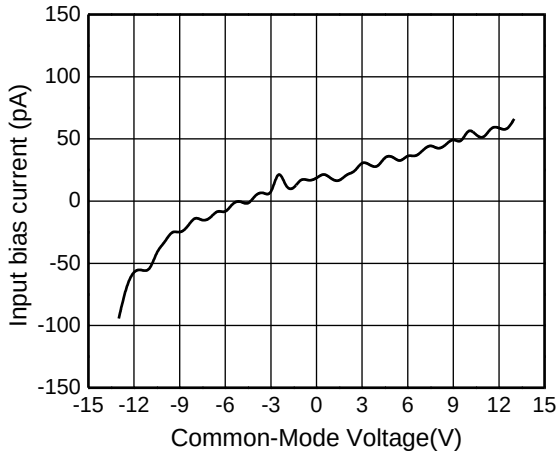
Input Offset Voltage vs. Common-Mode Voltage



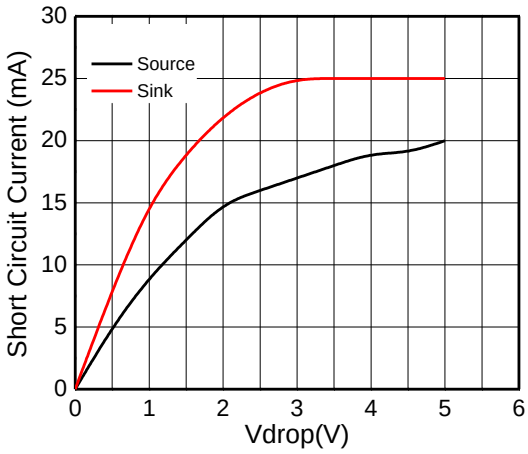
Input Offset Voltage vs. Temperature



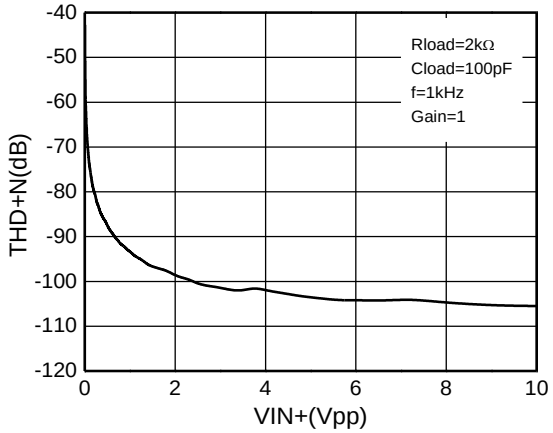
Input Bias Current vs. Common-Mode Voltage



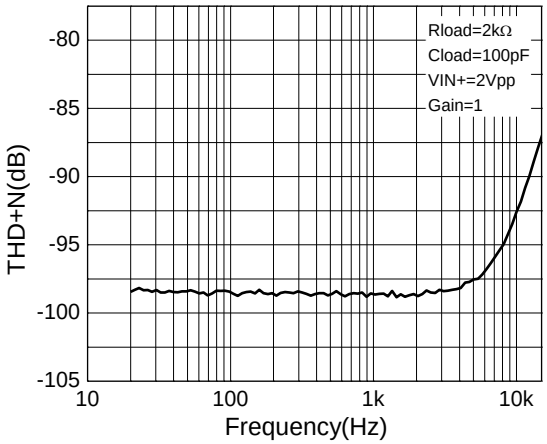
Output Swing vs. Load Current



THD+Noise vs. V_{IN}+

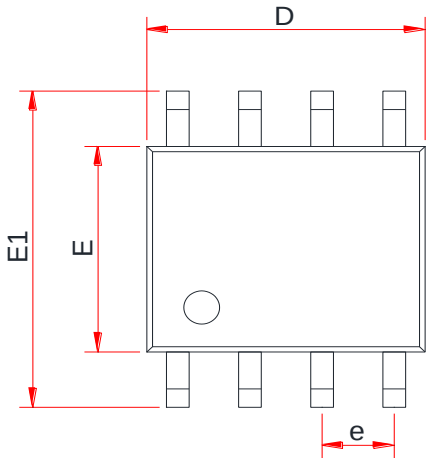


THD+Noise vs. Frequency

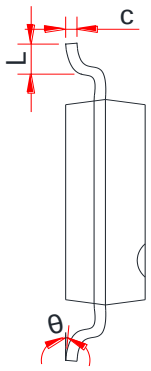


PACKAGE OUTLINE DIMENSIONS

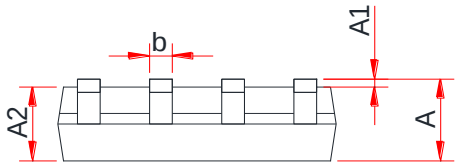
SOP-8L



TOP VIEW



SIDE VIEW



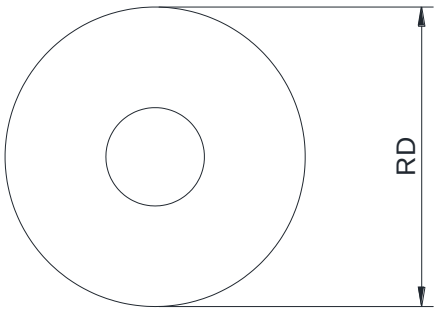
SIDE VIEW

Symbol	Dimensions In Millimeters (mm)		
	Min.	Typ.	Max.
A	1.35	1.55	1.75
A1	0.05	0.15	0.25
A2	1.25	1.40	1.65
b	0.33	-	0.51
c	0.15	-	0.26
D	4.70	4.90	5.10
E	3.70	3.90	4.10
E1	5.80	6.00	6.20
e	1.27BSC		
L	0.40	-	1.27
θ	0°	-	8°

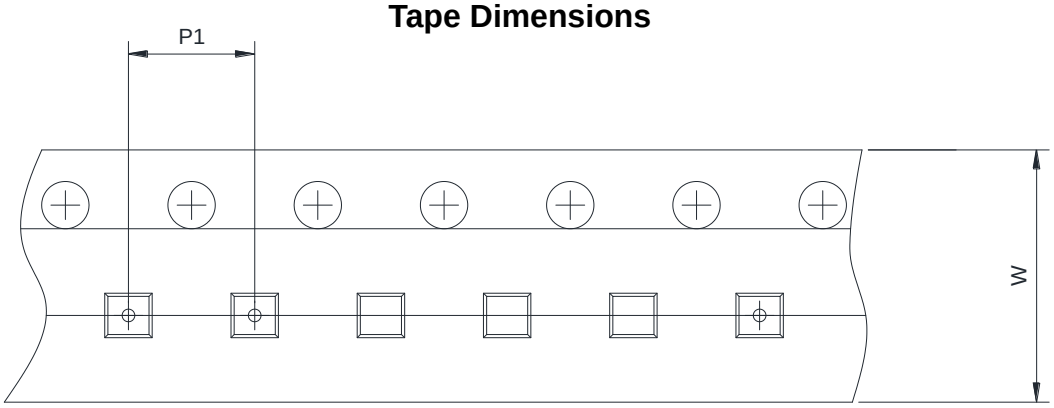
TAPE AND REEL INFORMATION

SOP-8L

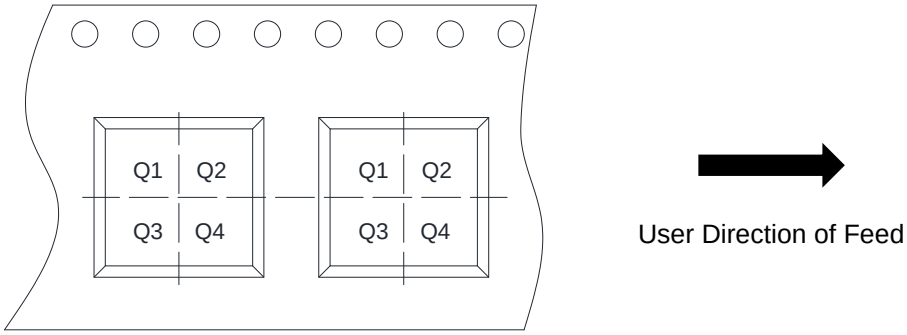
Reel Dimensions



Tape Dimensions



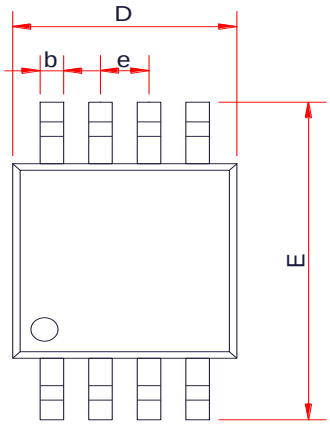
Quadrant Assignments For PIN1 Orientation In Tape



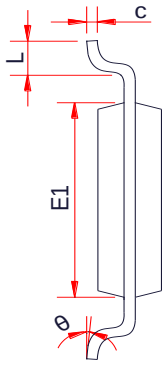
RD	Reel Dimension	☐ 7inch ☑ 13inch
W	Overall width of the carrier tape	☐ 8mm ☑ 12mm
P1	Pitch between successive cavity centers	☐ 2mm ☐ 4mm ☑ 8mm
Pin1	Pin1 Quadrant	☑ Q1 ☐ Q2 ☐ Q3 ☐ Q4

PACKAGE OUTLINE DIMENSIONS

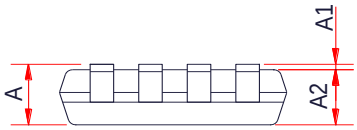
MSOP-8L



TOP VIEW



SIDE VIEW



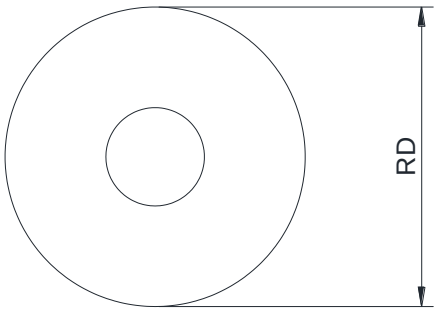
SIDE VIEW

Symbol	Dimensions In Millimeters (mm)		
	Min.	Typ.	Max.
A	-	-	1.10
A1	0.02	-	0.15
A2	0.75	0.80	0.95
b	0.25	-	0.38
c	0.09	-	0.23
D	2.90	3.00	3.10
E	4.75	4.90	5.05
E1	2.90	3.00	3.10
e	0.65 BSC		
L	0.40	-	0.80
θ	0°	-	6°

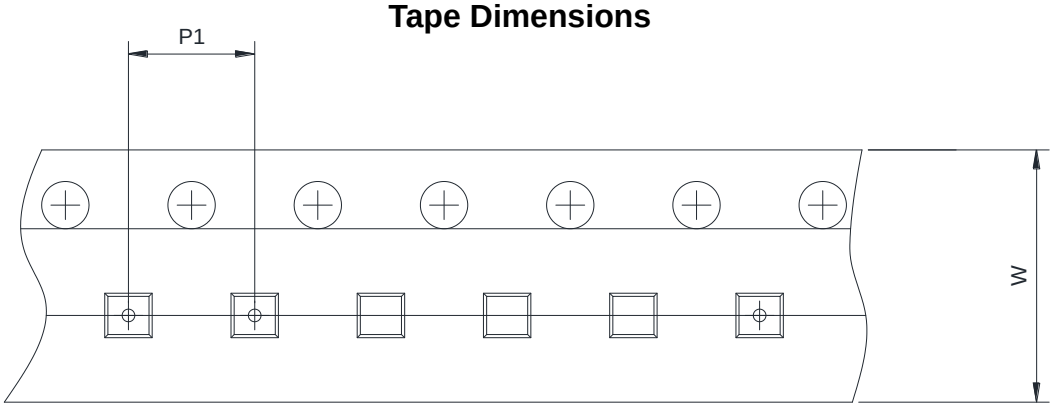
TAPE AND REEL INFORMATION

MSOP-8L

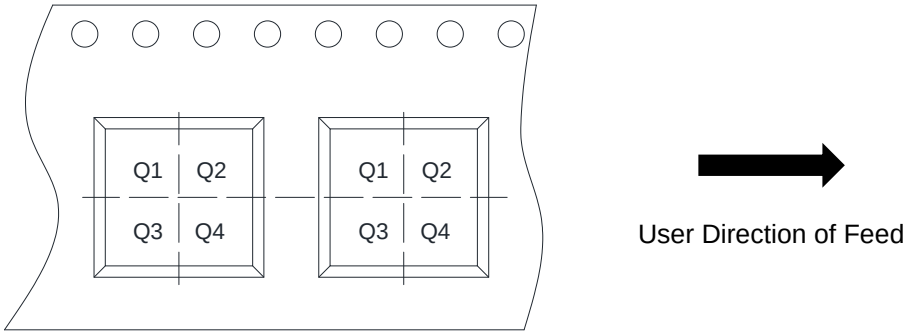
Reel Dimensions



Tape Dimensions



Quadrant Assignments For PIN1 Orientation In Tape



RD	Reel Dimension	☐ 7inch ☑ 13inch
W	Overall width of the carrier tape	☐ 8mm ☑ 12mm
P1	Pitch between successive cavity centers	☐ 2mm ☐ 4mm ☑ 8mm
Pin1	Pin1 Quadrant	☑ Q1 ☐ Q2 ☐ Q3 ☐ Q4

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