WS72052

180MHz,Rail-to-Rail I/O,CMOS Operational Amplifiers

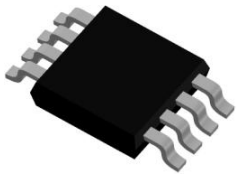
Http://www.omnivision-group.com

Descriptions

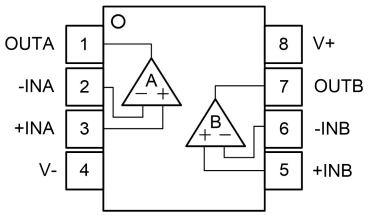
The WS72052 is a dual high-speed, voltage-feedback CMOS operational amplifier. It is designed for video and other applications which require wide bandwidth. It is unity-gain stable and can provide large output current. Quiescent current is only 3.6mA/Amplifier.

The WS72052 is optimized for operation on single or dual supplies as low as 2.5V (±1.25V) and up to 5.5V (±2.75V). The output swing is within 15mV of the rails, supporting wide dynamic range. It is suitable for applications requiring high continuous output current. It is completely independent circuitry for lowest crosstalk and freedom from interaction.

The WS72052 is available with MSL 3 Level in MSOP-8L package. Standard products are Pb-Free and halogen-Free.



MSOP-8L



MSOP-8L
Pin configuration (Top view)

MSOP-8L

Marking

2052 = Device code
GM = Special code
Y = Year code
W = Week code

Applications

- Video Processing
- Ultrasound
- Optical Networking, Tunable Lasers
- Photo-diode Trans-impedance Amplifiers
- Active Filters
- High-Speed Integrator
- Analog-to-Digital(A/D) Converter Input Buffers
- Digital-to-Analog (D/A) Converter Output Amplifiers

Features

- -3dB Bandwidth: 180MHz
- High Slew Rate: 130V/μs
- Low Noise: 7nV/$\sqrt{Hz}$ at 1MHz
- Rail-to-Rail Input and Output
- Low Input Bias Current: 2pA
- Quiescent Current: 3.6mA/Amplifier(TYP)
- 2.5V to 5.5V Single Supply or ±1.25V to ±2.75V Dual Power Supplies
- -40°C to +125°C Operating Temperature Range

Order Information

Device	Package	Shipping
WS72052M-8/TR	MSOP-8L	4000/Reel &Tape

Pin Descriptions

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

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage, ([V+] - [V-])	V_S(2)	5.5	V
Operating Supply Voltage Range	V_{IDR}	2.5 to 5.5	V
All Other Pins	V_{ICR}	(V-)-0.3 to (V+)+0.3	V
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.

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	±8000	V
MM	Machine Model ESD	JEDEC-EIA/JESD22-A115	±400	V
CDM	Charged Device Model ESD	JEDEC-EIA/JESD22-C101E	±2000	V

Note:

This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. Will Semiconductor Ltd. recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

Electronics Characteristics

At T_A = 25°C, V_S = 2.7V to 5.5V, V_{CM} = V_S/2, V_{OUT} = V_S/2, R_L = 1kΩ connected to V_S/2, unless otherwise noted.

Symbol	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
INPUT CHARACTERISTICS						
V_{OS}	Input Offset Voltage	V_S=5V		1	6	mV
$\Delta V_{OS}/\Delta T$	Input Offset Voltage	-40°C≤T_A≤+125°C		6.5		μV/°C
I_B	Input Bias Current			2		pA
V_{CM}	Input Common Mode Voltage Range		(-V_S)-0.1		(+V_S)-0.1	V
CMRR	Common Mode Rejection Ratio	V_S=5.5V,-0.1V<V_{CM}<5.6V		440		μV/V
		V_S=5.5V,-0.1V<V_{CM}<3.5V		20		
A_{OL}	Open-Loop Voltage Gain	(-V_S)+0.3V<V_{OUT}<(+V_S)-0.3V,R_L=1kΩ		114		dB
		(-V_S)+0.4V<V_{OUT}<(+V_S)-0.4V,R_L=1kΩ		116		dB
OUTPUT CHARACTERISTICS						
V_{OH}	Output Voltage Swing from Vs	V_S=5V, R_L=1kΩ		15	30	mV
V_{OL}	Output Voltage Swing from 0	V_S=5V, R_L=1kΩ		20	35	mV
I_{SOURCE}	Short-Circuit Current	V_S=5V	212	242		mA
		V_S=3V		90		
I_{SINK}	Short-Circuit Current	V_S=5V	170	200		mA
		V_S=3V		80		
	Closed-Loop Output Impedance	f<100kHz		0.3		Ω
DYNAMIC PERFORMANCE						
f_{-3dB}	-3dB Small-Signal Bandwidth	G=+1,V_{OUT}=100mV_{PP},R_F=25Ω		180		MHz
		G=+2,V_{OUT}=100mV_{PP}		130		
GBP	Gain-Bandwidth Product	G=+10,V_{OUT}=100mV_{PP}		130		MHz
	Bandwidth for 0.1dB Gain Flatness	G=+2,V_{OUT}=100mV_{PP}		30		MHz
SR	Slew Rate	V_S=5V,V_{OUT}=2V_{PP}		130		V/μs
		V_S=5V,V_{OUT}=4V_{PP}		135		
	Rise-and-Fall Time	G=+1,V_{OUT}=200mV_{PP},10% to 90%		5		ns
		G=+1,V_{OUT}=2V_{PP},10% to 90%		11		
	Settling Time to 0.1%	V_{OUT}=2V_{PP}		17		ns
		V_{OUT}=4V_{PP}		35		
	Overload Recovery Time	V_{IN} x G=V_S		42		ns
	Crosstalk	f=5MHz		-102		dB
POWER SUPPLY						
V_S	Specified Voltage Range		2.7		5.5	V
	Operating Voltage Range		2.5		5.5	V

Electronics Characteristics (Continued)

At T_A = 25°C, V_S = 2.7V to 5.5V, V_{CM} = V_S/2, V_{OUT} = V_S/2, R_L = 1kΩ connected to V_S/2, unless otherwise noted.

I_Q	Quiescent Current/Amplifier	V_S=5V, I_{OUT}=0		3.6	5	mA
PSRR	Power Supply Rejection Ratio	V_S=2.7V to 5.5V, V_{CM}=(V_S/2)-0.55V		30		μV/V
NOISE / DISTORTION PERFORMANCE						
e_n	Input Voltage Noise	f=1MHz		7		nV/Hz
i_n	Input Current Noise Density	f=1MHz		10		fA/Hz
	Harmonic Distortion (2nd-Harmonic)	G=+1,f=1MHz,V_{OUT}=2V_{PP}, R_L=200Ω,V_{CM}=1.5V		-66		dBc
	Harmonic Distortion (3rd-Harmonic)	G=+1,f=1MHz,V_{OUT}=2V_{PP}, R_L=200Ω,V_{CM}=1.5V		-70		dBc
THERMAL SHUTDOWN						
	Thermal Shutdown			150		°C
	Reset from Shutdown			130		°C

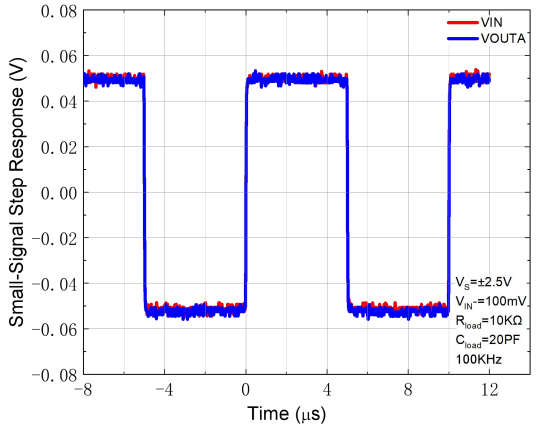
Note:

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.

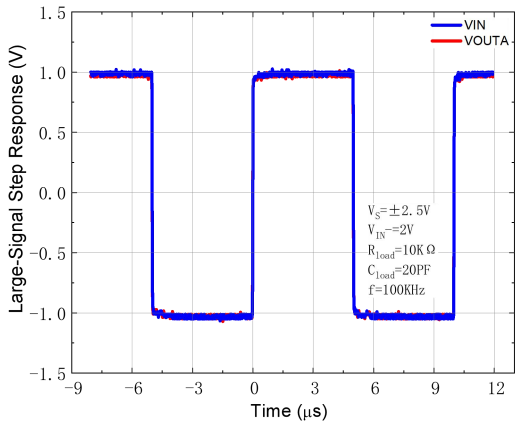
Typical Characteristics

At T_A = 25°C, VS=±2.5V, VCM=0V, Rload = 600Ω, Cload = 20pF, unless otherwise noted.

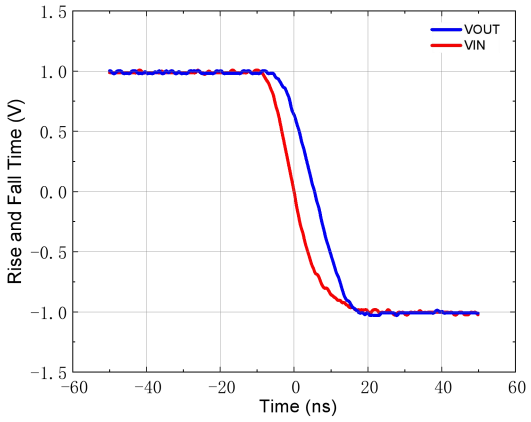
Small - Signal Step Response



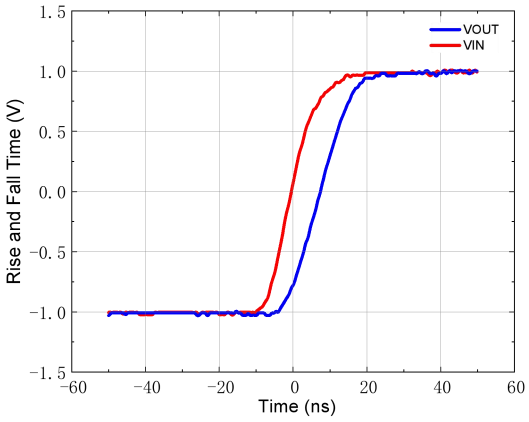
Large - Signal Step Response



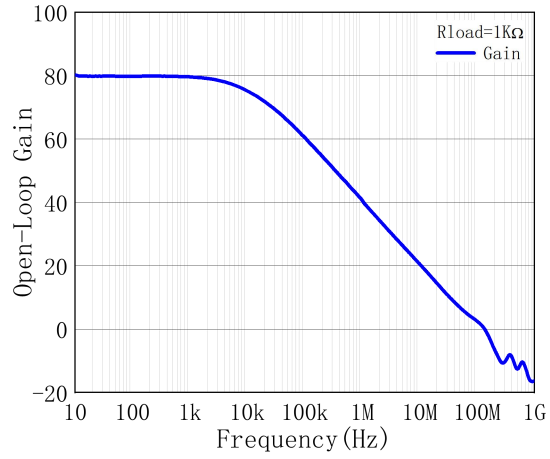
Rise and Fall Time



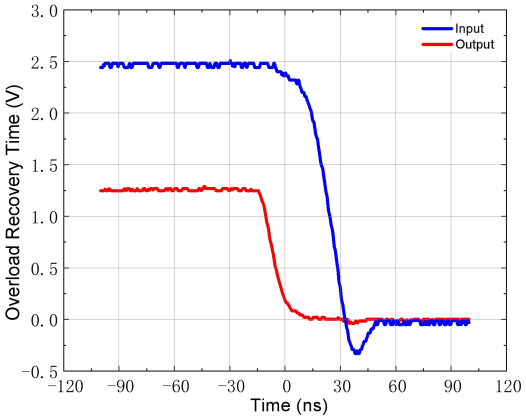
Rise and Fall Time



Bandwidth



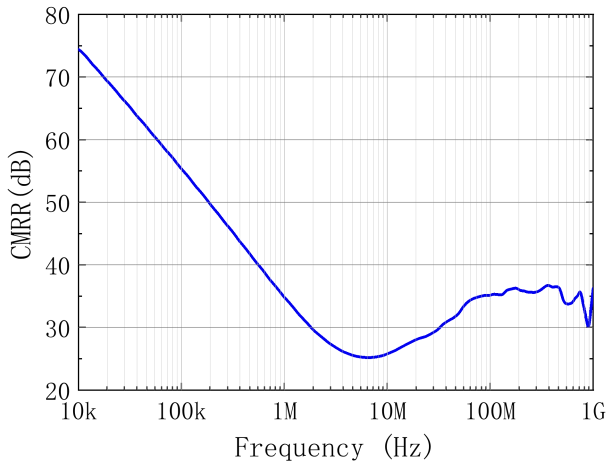
Overload Recovery Time



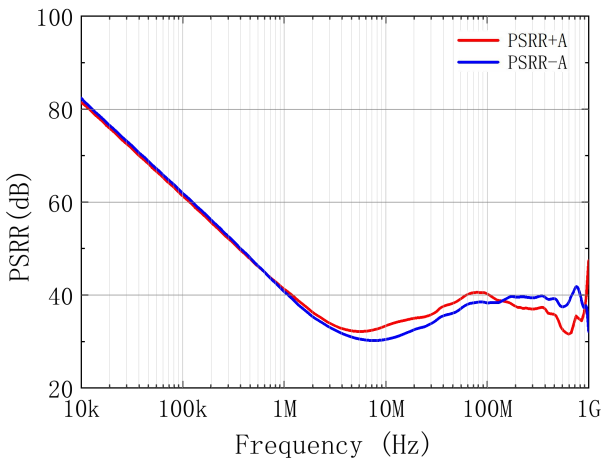
Typical Characteristics (continued)

T_A=25°C, V_S=±2.5V, V_{CM}=0V, R_{load} = 600Ω, C_{load} = 20pF, unless otherwise noted.

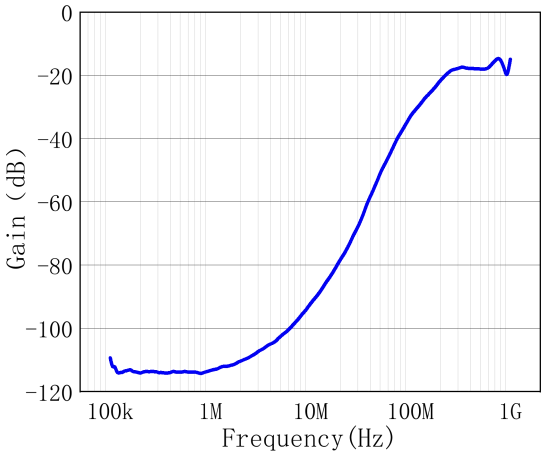
CMRR



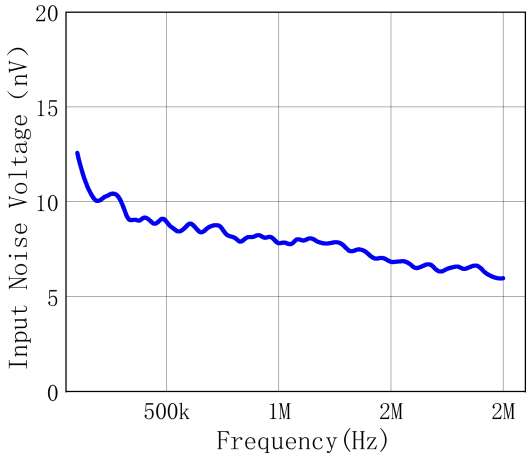
PSRR



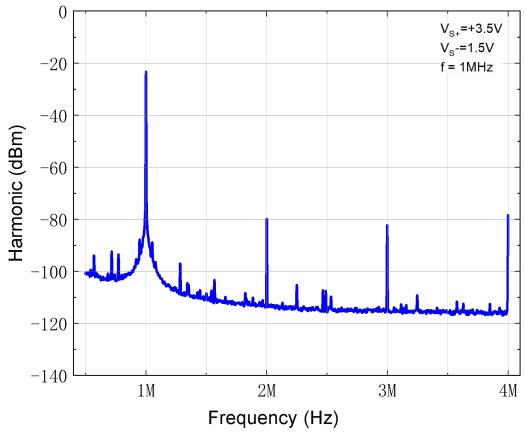
Crosstalk



Noise



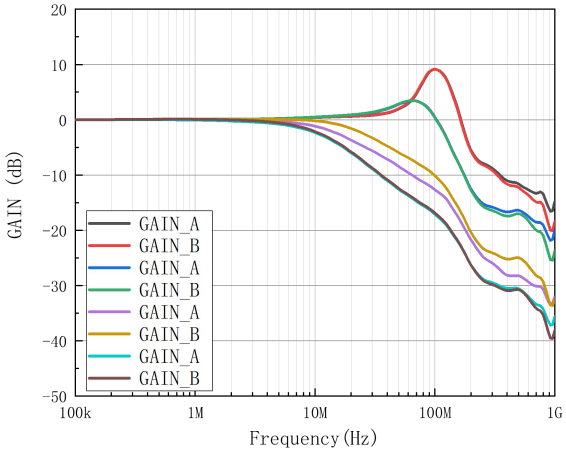
Harmonic



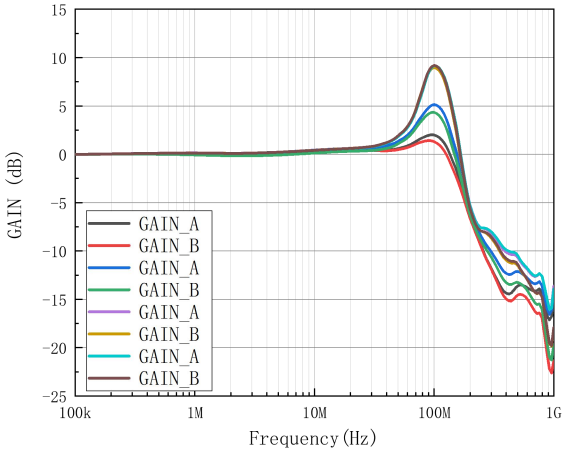
Typical Characteristics (continued)

T_A=25°C, V_S=±2.5V, V_{CM}=0V, R_{load} = 600Ω, C_{load} = 20pF, unless otherwise noted.

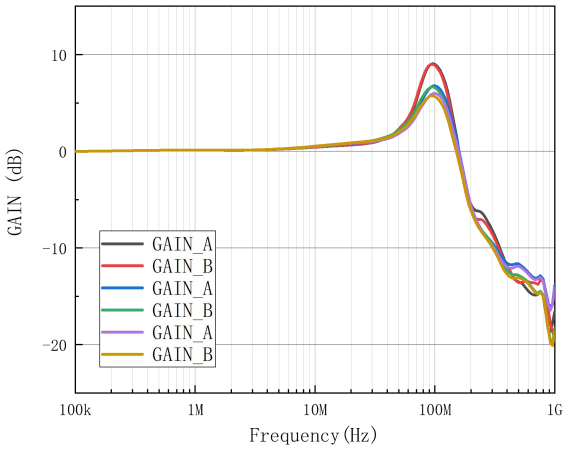
Frequency Response



Frequency Response（2）



Frequency Response（3）



PACKAGE OUTLINE DIMENSIONS

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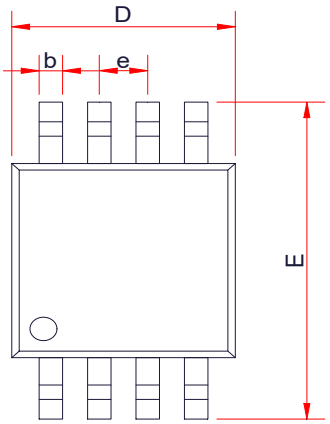
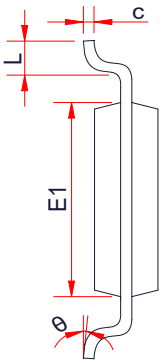
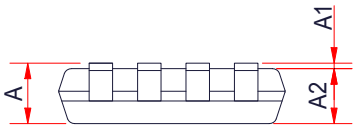


TOP VIEW



SIDE VIEW



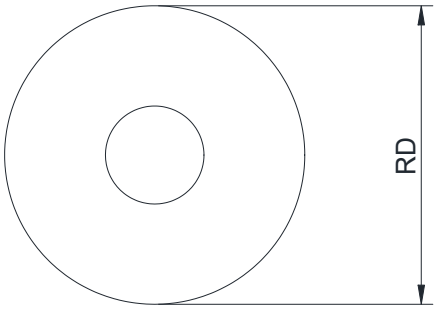
SIDE VIEW

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°

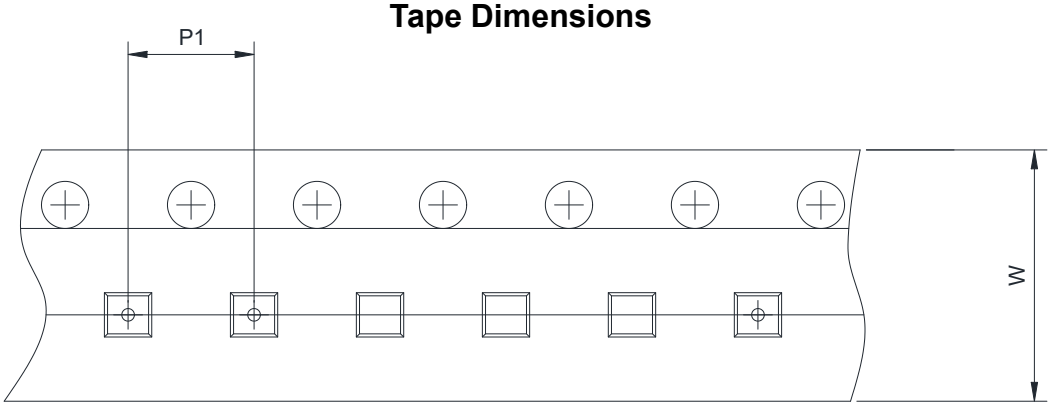
TAPE AND REEL INFORMATION

MSOP-8L

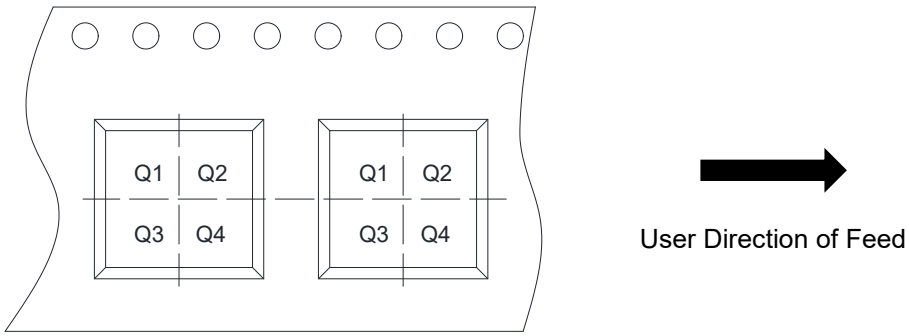
Reel Dimensions



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