WAS7227Q

USB High speed (480Mbps), DPDT Analog Switch **Http//:www.sh-willsemi.com**

Descriptions

The WAS7227Q is a high performance, double pole double throw (DPDT) CMOS analog switch that operates from a single +2.5V to +4.5V power supply.

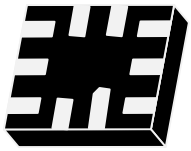
The WAS7227Q is designed for switching of high-speed USB2.0 signals in handset and consumer applications, such as cell phones, digital cameras, and notebooks with hubs or controllers with limited USB I/Os.

The WAS7227Q has low bit-to-bit skew and high channel-to-channel noise isolation, and is compatible with various standards, such as high-speed USB 2.0 (480Mbps). Each switch is bi-directional and offers little attenuation of the high-speed signals at the outputs. Its bandwidth is quite marginal to pass high-speed USB 2.0 differential signals (480Mbps) with good signal integrity.

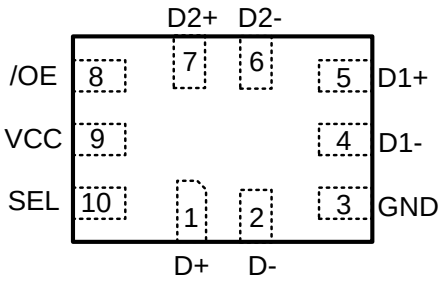
The WAS7227Q is featured with special circuitry on the D+/D-, which allows the device to withstand a VBUS short to D+ or D- when the USB devices are either powered off or on.

The SEL/OE pin has overvoltage protection that allows voltages above VCC, up to 7.0V to be present on the pin without damage or disruption of operation of the part, regardless of the operating voltage. The WAS7227Q is also featured with smart circuitry to minimize VCC leakage current even when SEL/OE control voltage is lower than VCC supply voltage. In other word, there is no need of additional device to shift SEL/OE level to be the same as that of VCC in real application.

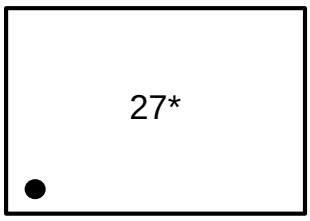
The WAS7227Q is available in QFN1418-10L package. Standard products are Pb-Free and halogen-Free.



QFN1418-10L



Pin configuration (Top view)



Marking

27 = Device code

*** = Month (A~Z)**

Order information

Device	Package	Shipping
WAS7227Q-10/TR	QFN1418-10L	3000/Reel&Tape

Applications

- Cell phones
- MID
- Router
- Other electronics equipments

Features

- Supply voltage : 2.5~ 4.5V
- -3dB Bandwidth : 550MHz @ C_L=5pF
- Off isolation : -38dB @ 250MHz
- Crosstalk : -47dB @ 250MHz
- Low quiescent current : <1uA

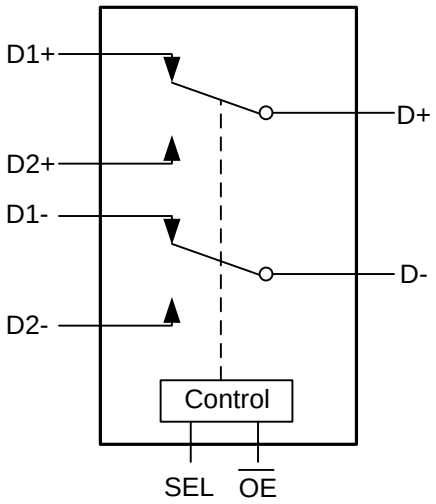
Pin descriptions

Pin Number	Symbol	Descriptions
1	D+	Port A common data terminal, Connect to D1+ or D2+ according to SEL logic
2	D-	Port B common data terminal, Connect to D1- or D2- according to SEL logic
3	GND	Ground
4	D1-	Port B data 1 terminal
5	D1+	Port A data 1 terminal
6	D2-	Port B data 2 terminal
7	D2+	Port A data 2 terminal
8	$\overline{OE}$	Enable control, Active low
9	VCC	Power supply
10	SEL	Switch select pin, digital logic low or high

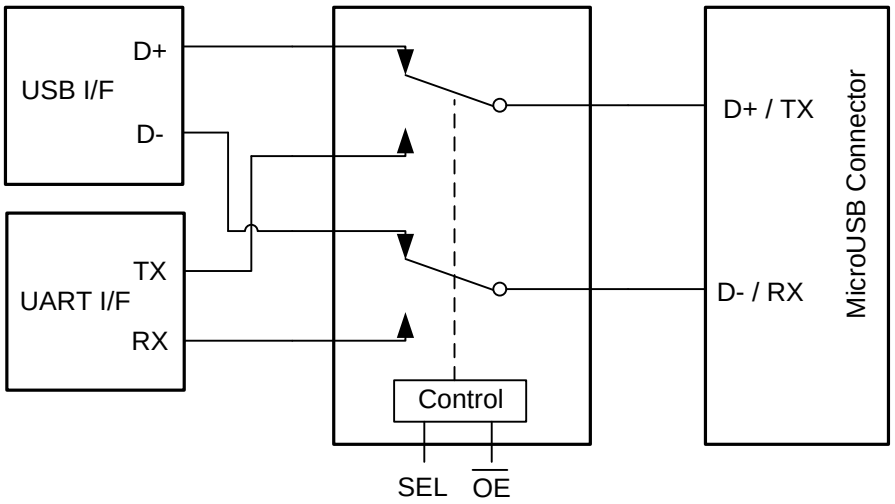
Function descriptions

SEL	$\overline{OE}$	Function
X	H	Switch disconnected
L	L	D+ connect to D1+ and D- connect to D1-
H	L	D+ connect to D2+ and D- connect to D2-

Logic symbol and typical applications



Logic Symbol



Typical Applications

Absolute maximum ratings

Parameter	Symbol	Value	Unit
Supply voltage range	VCC	-0.3 ~ 6.5	V
Data input/output voltage range	V_{AC}	-0.3 ~ 6.5	V
Select input voltage range	V_{SEL}	-0.3 ~ 6.5	V
Continues output current	I_{OUT}	±50	mA
Junction temperature range	T_J	150	^oC
Lead temperature range	T_L	260	^oC
Storage temperature range	T_{STG}	-65 ~ 150	^oC
Thermal resistance	$R_{\theta JA}$	250	$^oC/W$
ESD protection (HBM)	All pins to GND	±8000	V
ESD protection (CDM)	All pins	±2000	V

Recommend operating ratings

Parameter	Symbol	Value	Unit
Supply voltage range	VCC	2.5 ~ 4.5	V
Data input/output voltage range	V_{IS}	0.0 ~ VCC	V
Select input voltage range	V_{SEL}	0.0 ~ VCC	V
Enable control input voltage range	V_{OE}	0.0 ~ VCC	V
Operating temperature range	T_{OPR}	-40 ~ 85	^oC

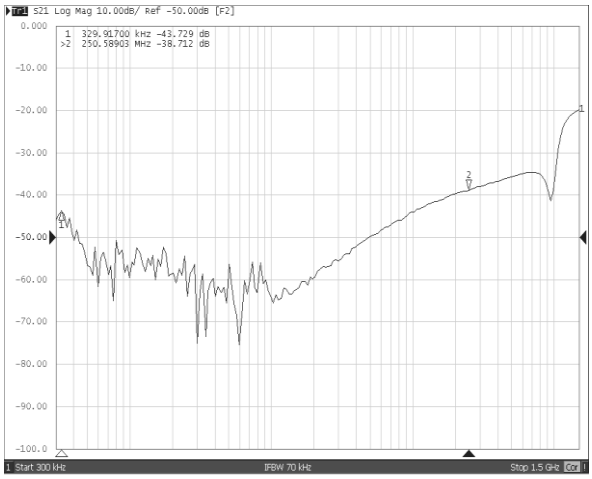
1. “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied.
2. The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.
3. Control input must be held high or Low, it must not float.

Electronics Characteristics (Ta=25°C, VCC=4.5V, unless otherwise noted)

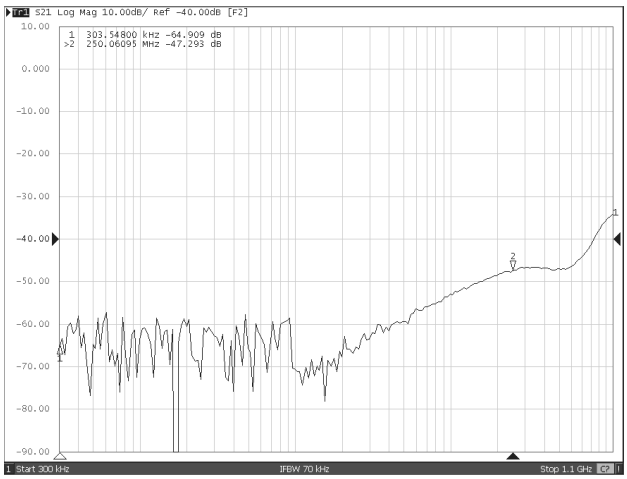
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Select and OE logic high level	V_{IH}	VCC=3.0～4.5	1.6			V
		VCC=2.5～3.0	1.4			V
Select and OE logic low level	V_{IL}	VCC=3.0～4.5			0.6	V
		VCC=2.5～3.0			0.4	V
Supply quiescent current	I_{CC}	I_{OUT}=0, V_{SEL} >1.5V or V_{SEL}<0.7V Refer to figure1			1.0	uA
Select pin leakage current	I_{SEL}	V_{SEL}=VCC			±1.0	uA
Off state leakage current	I_{OFF}	Figure 2			±1.0	uA
On state switch leakage current	I_{ON}	Figure 3			±1.0	uA
On-Resistance	R_{ON}	VCC=3.0V, V_{IS}=0~0.4V, I_{OUT}=8mA, Figure 4		5.0	7.5	Ω
On-Resistance match	ΔR_{ON}	VCC=3.0V, V_{IS}=0~0.4V, I_{OUT}=8mA, Figure 4		0.1	0.2	Ω
On-Resistance flatness	$R_{FLAT(ON)}$	VCC=3.0V, V_{IS}=0~1.0V, I_{OUT}=8mA, See figure 4		1.8	2.2	Ω
Propagation delay time	T_{PLH} / T_{PHL}	C_L=5pF, R_L=50Ω Figure 5		0.25		ns
Select input to switch on time	T_{ON}	C_L=10pF, R_L=50Ω Figure 6		48	70	ns
Select input to switch off time	T_{OFF}	C_L=10pF, R_L=50Ω Figure 6		43	65	ns
Break-Before-Make time	T_{BBM}	Generated by design	0.5			ns
-3dB Bandwidth	BW	R_L=50Ω, C_L=5pF		550		MHz
		R_L=50Ω, C_L=0pF		800		
Off isolation	OIRR	R_L=50Ω, F=250MHz		-38		dB
Crosstalk	Xtalk	R_L=50Ω, F=250MHz		-47		dB
Select pin input capacitance	C_{IN}	VCC=0V		3.5		pF
D1n, D2n,Dn Off capacitance	C_{OFF}	VCC=3.3V, $\overline{OE}$=3.3V		2.5		pF
D1n, D2n,Dn On capacitance	C_{ON}	VCC=3.3V, $\overline{OE}$=0V		3.8		pF

Typical Characteristics (Ta=25°C, VCC=4.5V, unless otherwise noted)

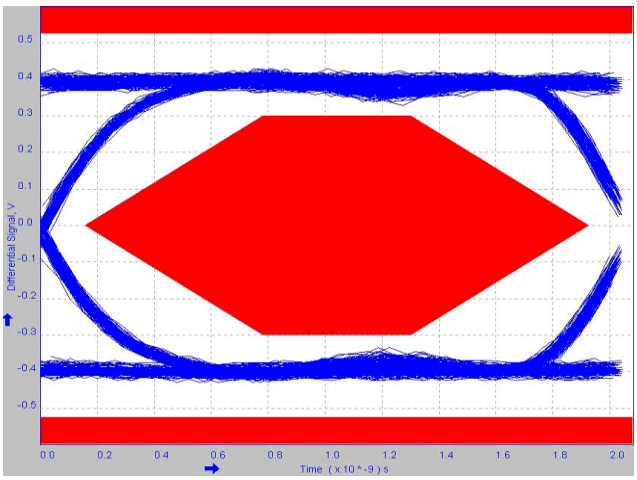
Bandwidth



Off isolation



Crosstalk



Eye Diagram (480Mbps)

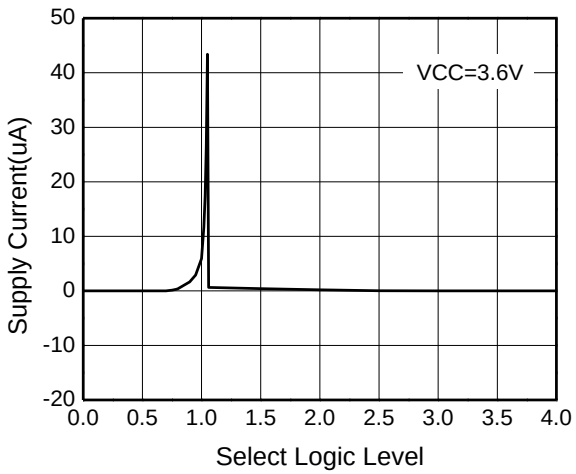


Figure 1: Supply current vs. Logic level

Test Circuit

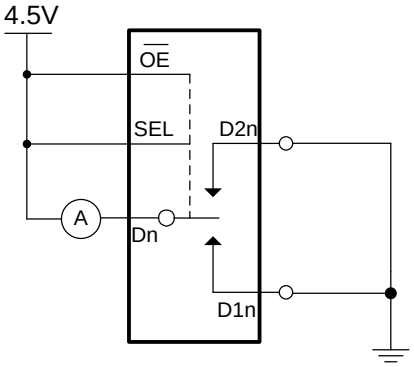


Figure 2: Off state leakage current

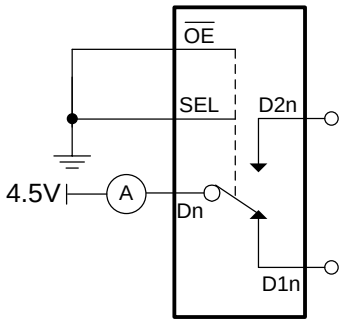


Figure 3: On state leakage current

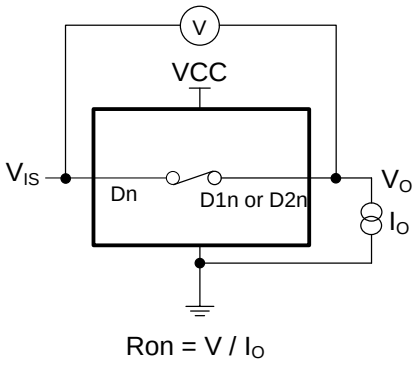


Figure 4: On-Resistance

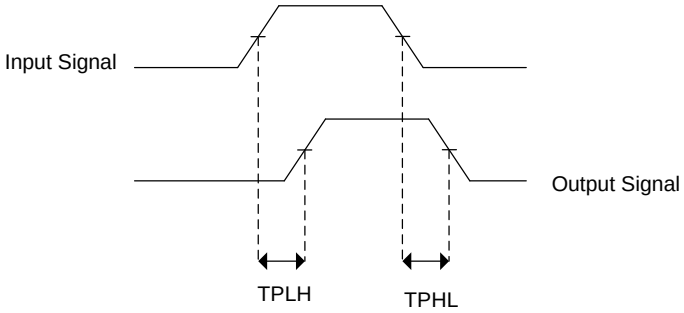
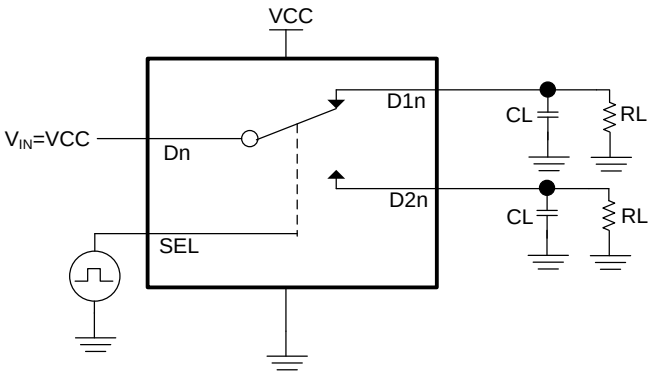


Figure 5: Propagation delay time



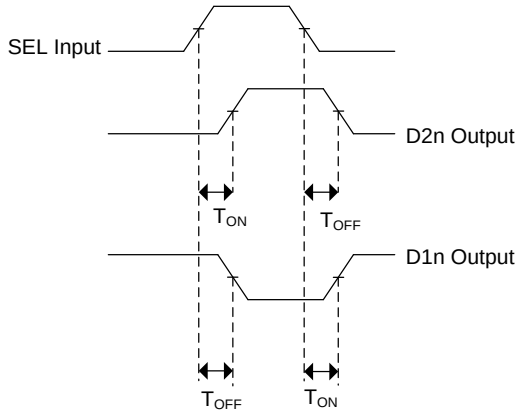
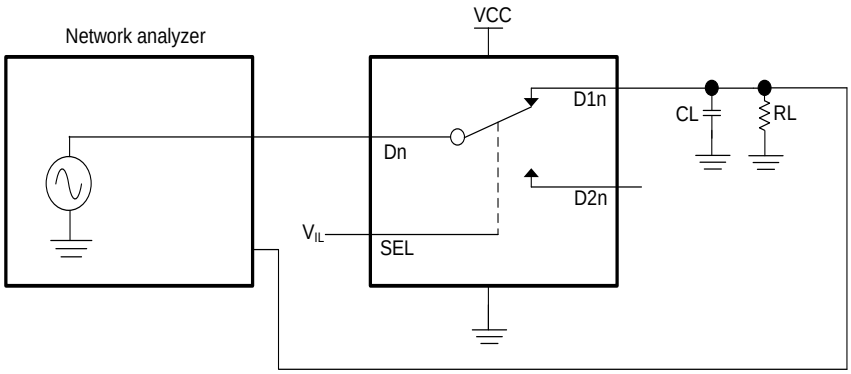
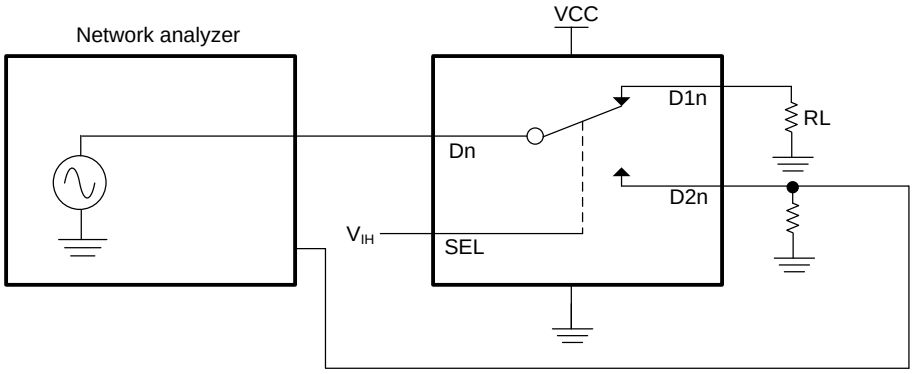


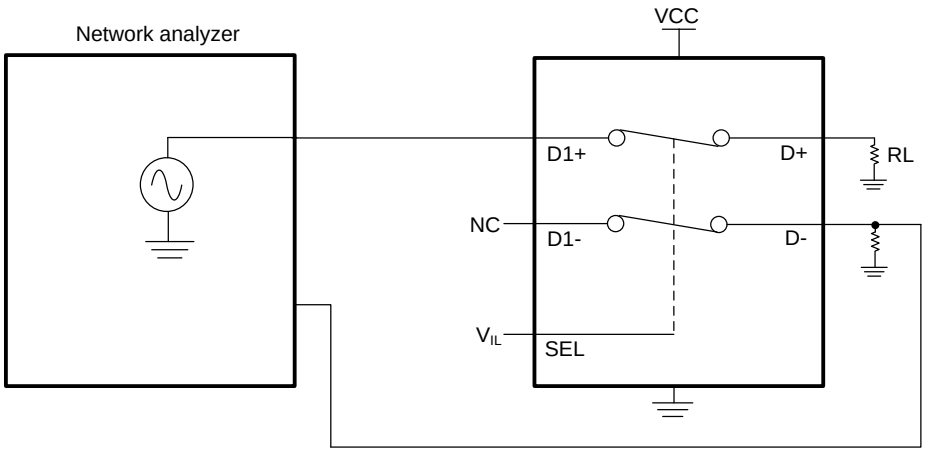
Figure 6: Select input to switch on/off time



Bandwidth (BW)



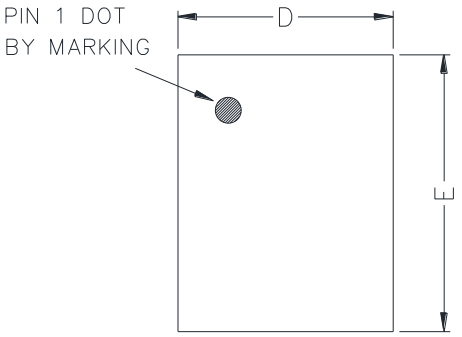
Off isolation (OIRR)



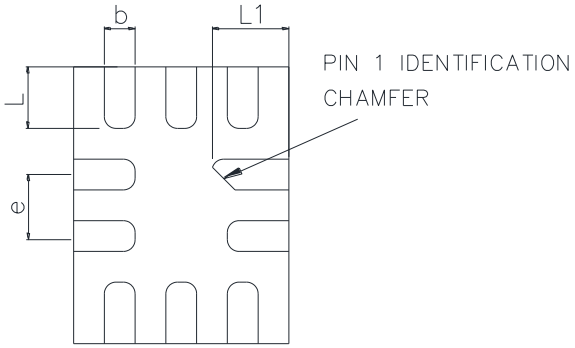
Crosstalk (Xtalk)

PACKAGE OUTLINE DIMENSIONS

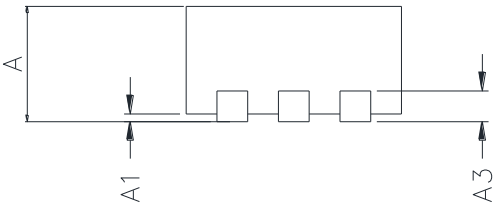
QFN1418-10L



TOP VIEW



BOTTOM VIEW

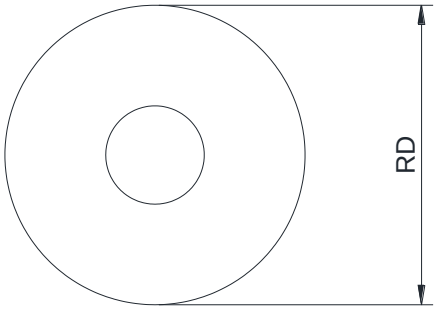


SIDE VIEW

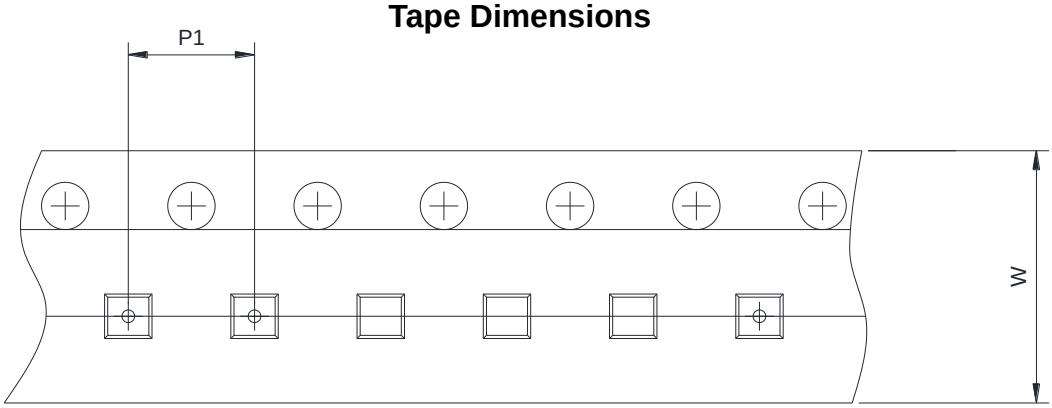
Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.50	0.55	0.60
A1	0.00	-	0.05
A3	0.15 Ref.		
D	1.35	1.40	1.45
E	1.75	1.80	1.85
b	0.15	0.20	0.25
L	0.30	0.40	0.50
L1	0.40	0.50	0.60
e	0.40 BSC		

TAPE AND REEL INFORMATION

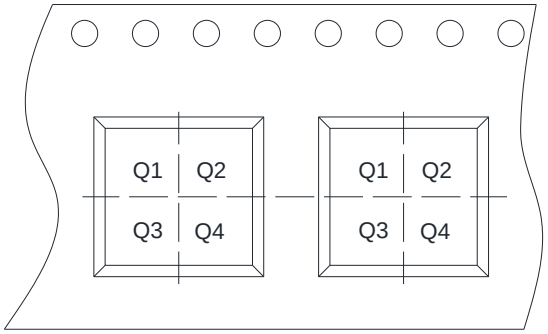
Reel Dimensions



Tape Dimensions



Quadrant Assignments For PIN1 Orientation In Tape



User Direction of Feed

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