WAS3157D

5.5Ω, 400MHz Bandwidth, SPDT Analog Switch

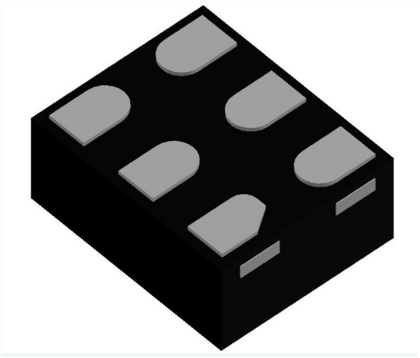
https://www.omnivision-group.com

Descriptions

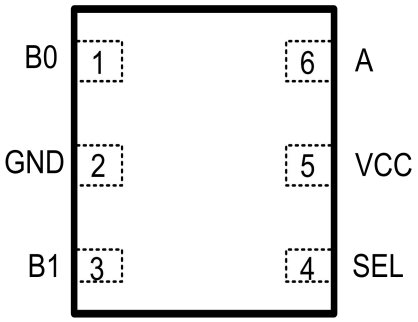
The WAS3157D is a high performance, single pole double throw (SPDT) CMOS analog switch for bus switching or audio switching applications. It features high bandwidth up to 400MHz at -3dB and low on-resistance (5.5Ω Typ.).

The SEL 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 WAS3157D is also featured with smart circuitry to minimize VCC leakage current even when SEL control voltage is lower than VCC supply voltage. In other word, there is no need of additional device to shift SEL level to be the same as that of VCC in real application.

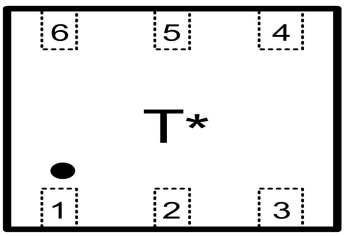
The WAS3157D is available in standard DFN1109-6L package. Standard product is Pb-Free and halogen-Free.



DFN1109-6L (Bottom View)



Pin configuration (Top view)



Marking
T = Device code
*** = Month code**

Features

- Supply voltage : 1.5 ~ 5.5V
- On-Resistance : 5.5Ω @ VCC=4.5V
- -3dB Bandwidth : 400MHz @ C_L=5pF
- Off isolation : -69dB @ 10MHz
- Low quiescent current : <1uA
- Break-before-make function
- ESD protection
  - HBM : ±8000V
  - MM : ±600V

Applications

- Cell phones
- MID
- Other portable equipments

Order information

Device	Package	Shipping
WAS3157D-6/TR	DFN1109-6L	3000/Reel&Tape

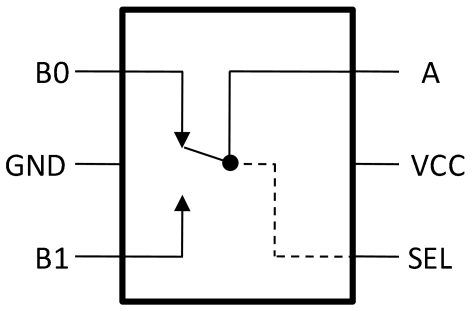
Pin descriptions

Pin Number	Symbol	Descriptions
1	B0	Data 0 terminal, Normally closed
2	GND	Ground
3	B1	Data 1 terminal, Normally open
4	SEL	Switch select pin, Digit logic low or high
5	VCC	Power supply
6	A	Common Data terminal, Connect to B0 or B1 according to SEL logic

Function descriptions

Logic Level (SEL pin, Pin 4)	Function
L	B0 connected to A
H	B1 connected to A

Function Block



Absolute maximum ratings

Parameter	Symbol	Value	Unit
Supply voltage range	VCC	-0.5 ~ 6.5	V
Data input/output voltage range	V_{B0}, V_{B1}, V_A	-0.5 ~ 6.5	V
Select input voltage range	V_{SEL}	-0.5 ~ 6.5	V
Continues current	I_{B0}, I_{B1}, I_A	±50	mA
Junction temperature range	T_J	150	°C
Lead temperature range	T_L	260	°C
Storage temperature range	T_{STG}	-65 ~ 150	°C
Thermal resistance	$R_{\theta JA}$	350	°C/W

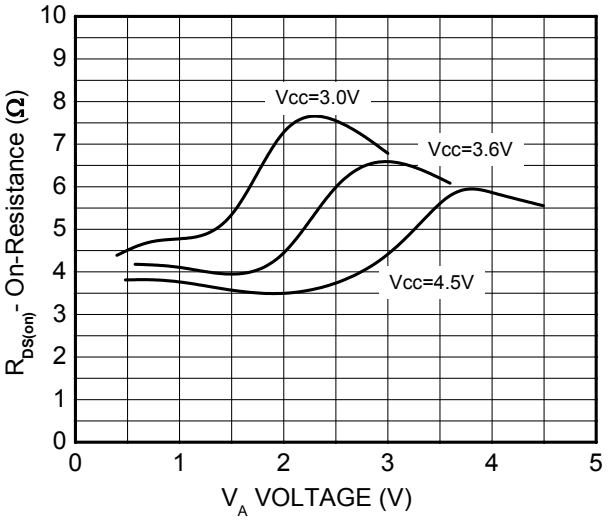
Recommend operating ratings

Parameter	Symbol	Value	Unit
Supply voltage range	VCC	1.5 ~ 5.5	V
Data input/output voltage range	V_{B0}, V_{B1}, V_A	0.0 ~ VCC	V
Select input voltage range	V_I	0.0 ~ VCC	V
Operating temperature range	T_A	-40 ~ 85	°C

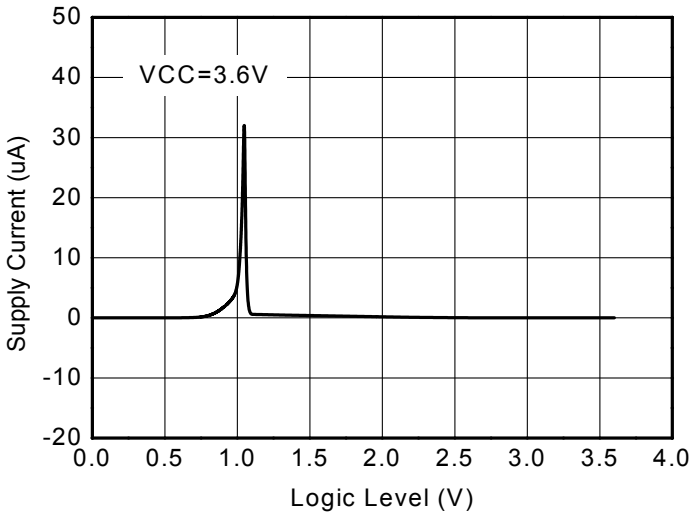
Electronics Characteristics (Ta=25°C, VCC=4.5V, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Select logic high level	V_{IH}	VCC=3.6～4.5V	1.5			V
		VCC=2.3～3.6V	1.3			V
Select logic low level	V_{IL}	VCC=3.6～4.5V			0.6	V
		VCC=2.3～3.6V			0.4	V
Quiescent current	I_{CC}	I_{OUT}=0			1.0	uA
Select input leakage current	I_{SEL}	V_{SEL}=0 ~ VCC			±0.1	uA
Off state switch leakage current	I_{OFF}	See figure 1			±0.1	uA
On state switch leakage current	I_{ON}	See figure 2			±0.1	uA
On-Resistance (Channel B0 and Channel B1)	R_{ON}	VCC=4.5V, V_A=4.5V, I_{OUT}=30mA, See figure 3		5.5	12	Ω
On-Resistance (Channel B0 or Channel B1)	R_{ON}	VCC=4.5V, V_A=0V, I_{OUT}=30mA, See figure 3		3.8	7.0	Ω
On-Resistance (Channel B0 or Channel B1)	R_{ON}	VCC=3.6V, V_A=3.6V, I_{OUT}=30mA, See figure 3		6.5	13	Ω
On-Resistance (Channel B0 or Channel B1)	R_{ON}	VCC=3.6V, V_A=0V, I_{OUT}=30mA, See figure 3		4.5	9.0	Ω
Propagation delay time (A to Bn or Bn to A)	T_{PLH} / T_{PHL}	C_L=50pF See figure 4, 5		0.3	1.2	ns
Select input to switch on time (A to Bn or Bn to A)	T_{ON}	C_L=50pF See figure 5		80	120	ns
Select input to switch off time (A to Bn or Bn to A)	T_{OFF}	C_L=50pF See figure 5		50	80	ns
Break-Before-Make time	T_{BBM}	Generated by design	0.5			ns
-3dB Bandwidth	BW	R_L=50Ω, C_L=5pF		400		MHz
Charge injection	Qg	C_L=0.1nF, VCC=5V		10		pC
Off isolation	OIRR	R_L=50Ω, F=10MHz		-69		dB
Crosstalk	Xtalk	R_L=50Ω, F=10MHz		-68		dB
Total harmonic distortion	THD	R_L=600Ω, F=1KHz V_A=0.5Vp-p		0.03		%
Select pin input capacitance	C_{IN}	VCC=0V		5.5		pF
B port off capacitance	C_{OFF}			7.5		pF
A port on capacitance	C_{ON}			18.5		pF

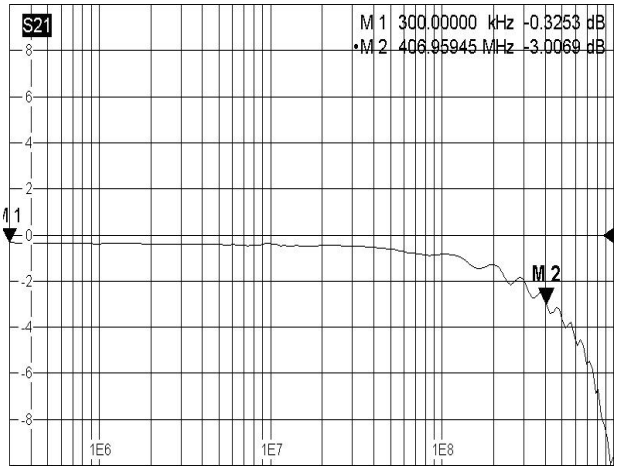
Typical Characteristics (Ta=25°C, VCC=4.5V, unless otherwise noted)



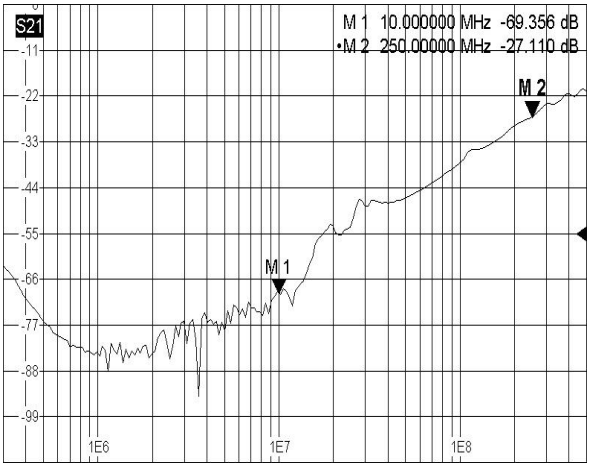
On-Resistance vs. VCC, VA voltage



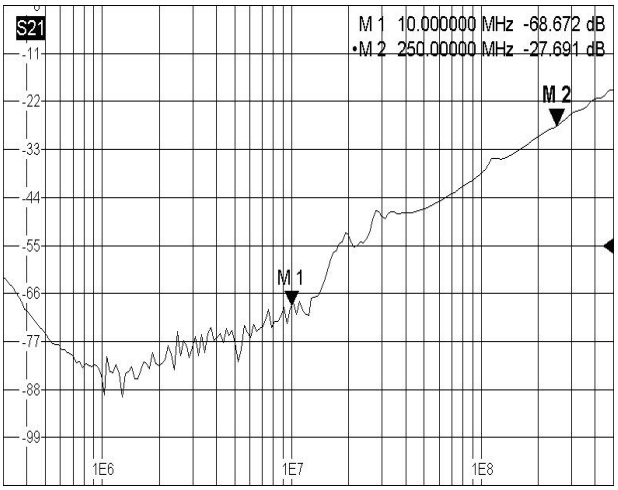
Supply current vs. Select logic level



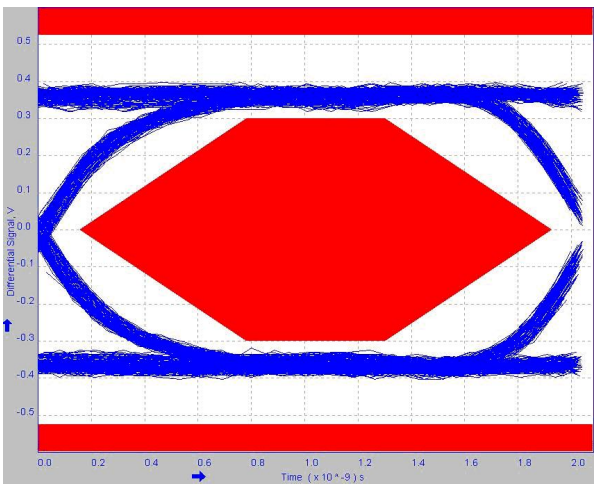
Bandwidth



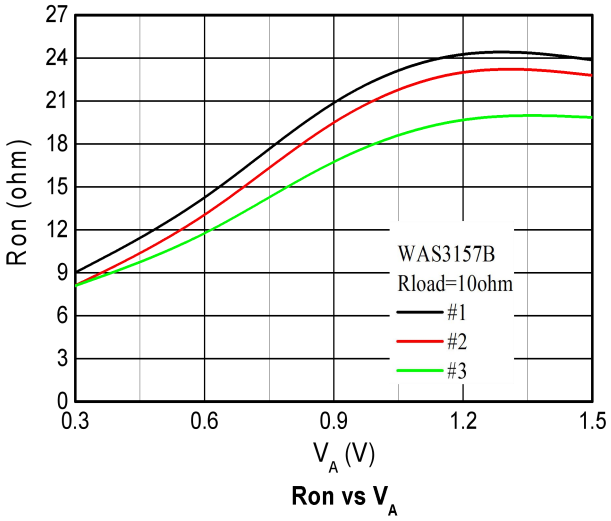
Off isolation



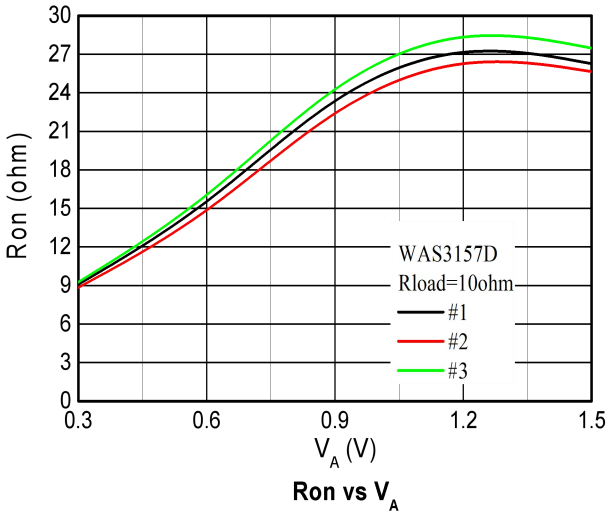
Crosstalk



Eye Diagram (480Mbps)

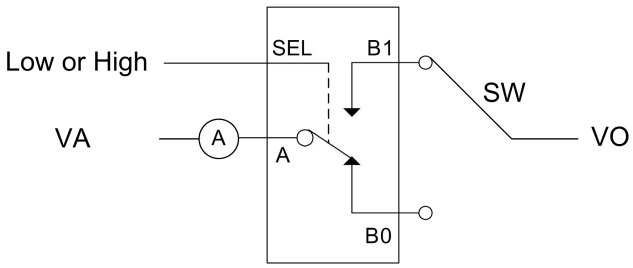


Ron vs V_A



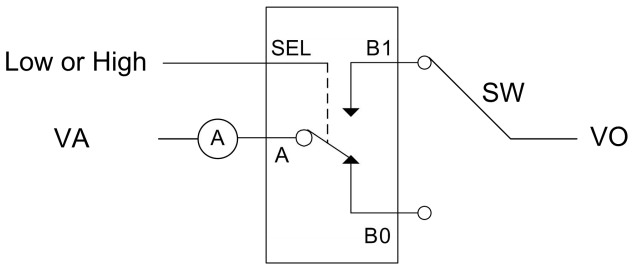
Ron vs V_A

Test Circuit



Conditions：
1: SEL=Low, SW=B1, VA=5.5V, VO=GND
3: SEL=High, SW=B0, VA=5.5V, VO=GND

Figure 1: Off state switch leakage current



Conditions：
1: SEL=Low, SW=B0, VA=5.5V, VO=Open
3: SEL=High, SW=B1, VA=5.5V, VO=Open

Figure 2: On state switch leakage current

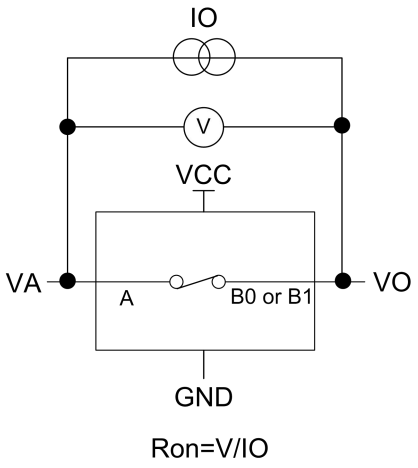


Figure 3: On-Resistance

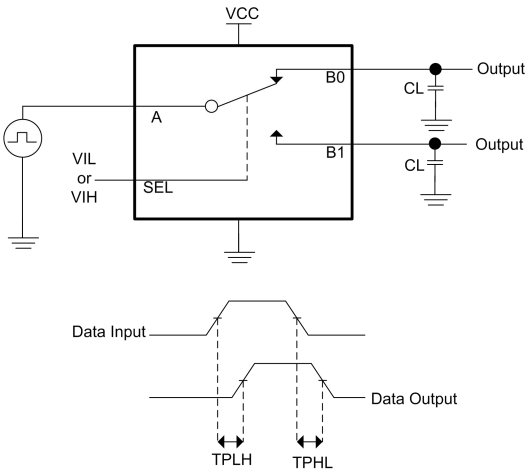
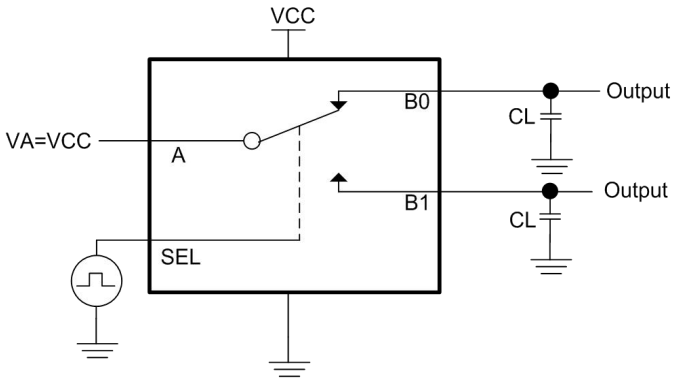


Figure 4: Propagation delay time



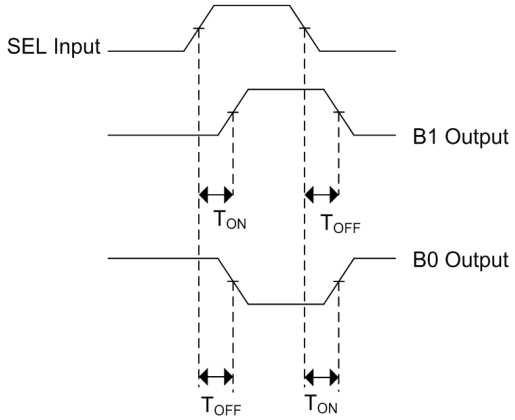
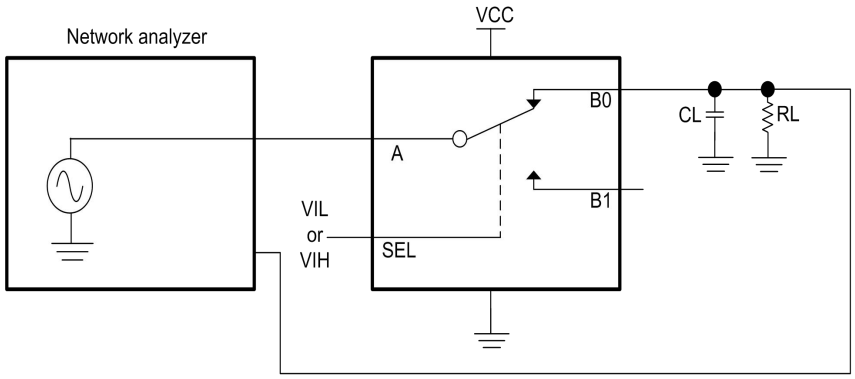
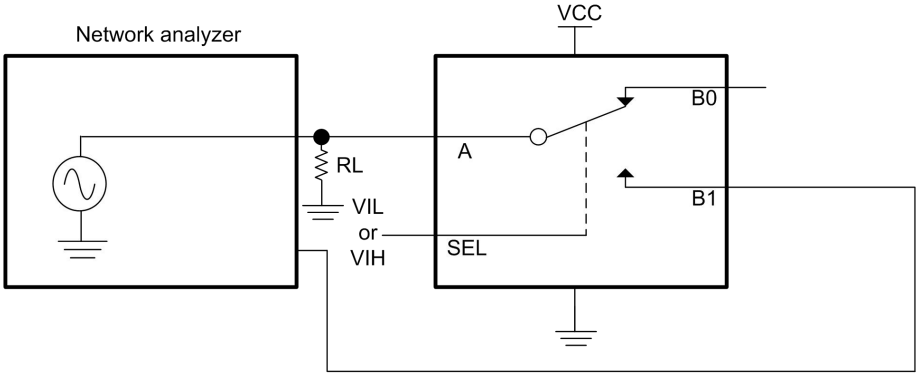


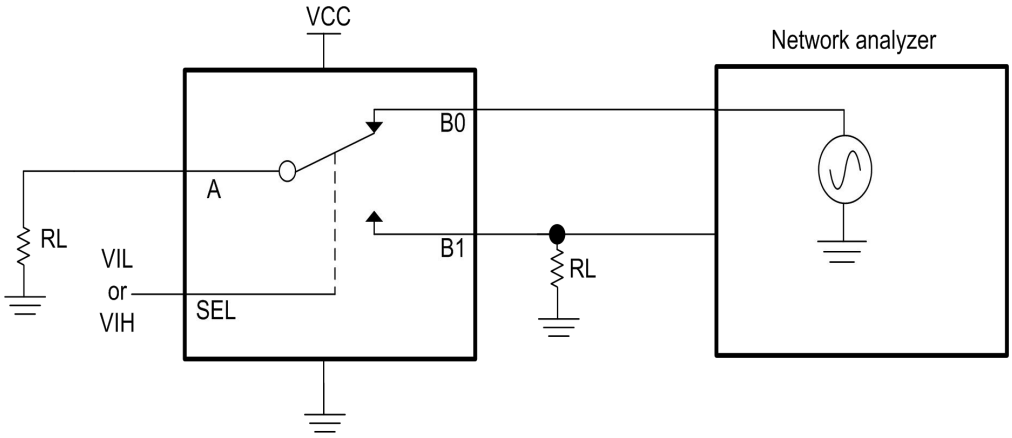
Figure 5: Select input to switch on/off time



Bandwidth (BW)



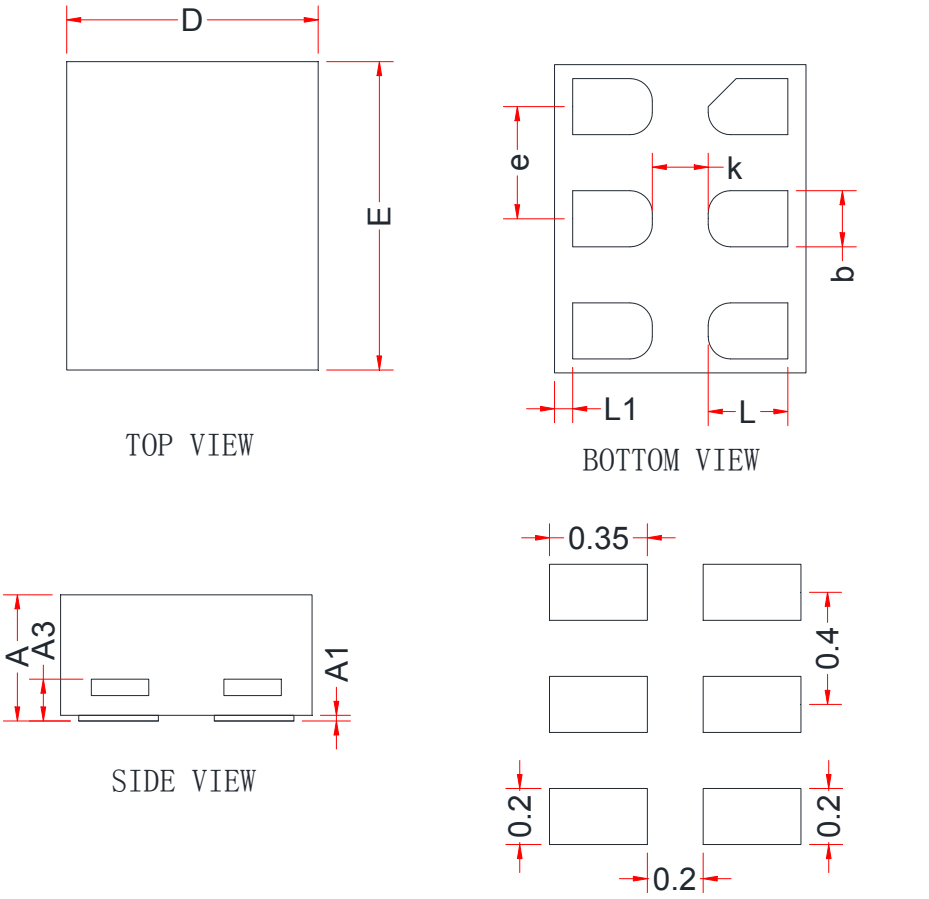
Off isolation (OIRR)



Crosstalk (Xtalk)

PACKAGE OUTLINE DIMENSIONS

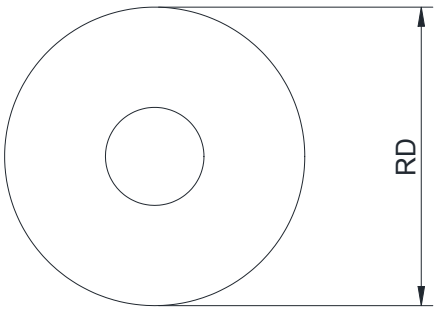
DFN1109-6L



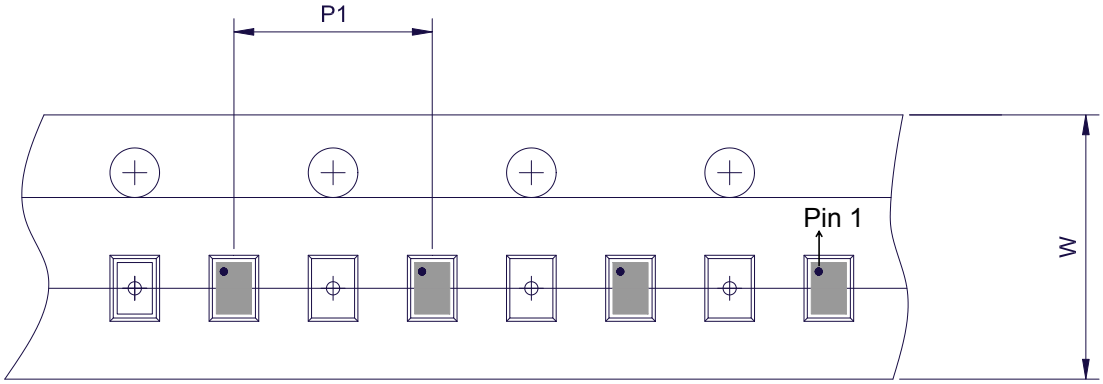
Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.40	0.45	0.50
A1	0.00	0.02	0.05
A3		0.15 Ref.	
b	0.15	0.20	0.25
D	0.80	0.90	1.00
E	1.00	1.10	1.20
e		0.40 BSC	
L	0.22	-	0.35
L1		0.05 Ref.	
k		0.20 Ref.	

TAPE AND REEL INFORMATION

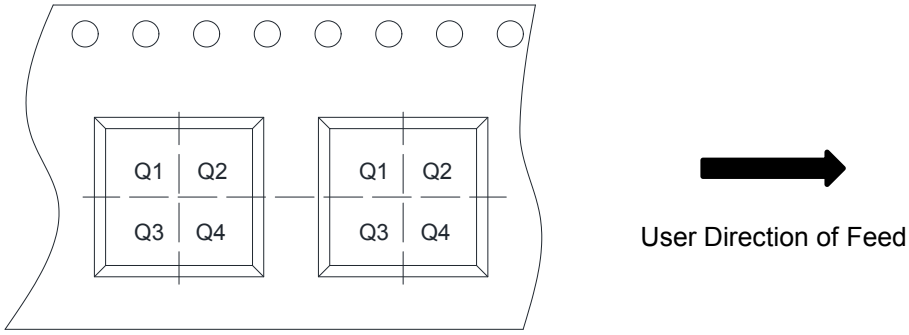
Reel Dimensions



Tape Dimensions



Quadrant Assignments For PIN1 Orientation In Tape



RD	Reel Dimension	☑ 7inch	☐ 13inch		
W	Overall width of the carrier tape	☑ 8mm	☐ 12mm	☐ 16mm	
P1	Pitch between successive cavity centers	☐ 2mm	☑ 4mm	☐ 8mm	
Pin1	Pin1 Quadrant	☑ Q1	☐ Q2	☐ Q3	☐ Q4