

# WAS3157B

## 5.5Ω, 400MHz Bandwidth, SPDT Analog Switch

Http://www.sh-willsemi.com

### Descriptions

The WAS3157B 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 WAS3157B 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.

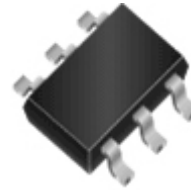
The WAS3157B is available in standard SOT-363(SC-70-6L) package. Standard product is Pb-Free and halogen-Free.

### Features

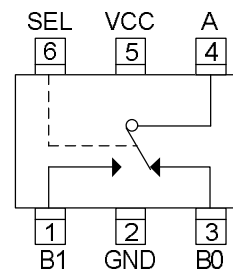
- Supply voltage : 2.3 ~ 5.5V
- On-Resistance : 5.5Ω @ VCC=4.5V
- -3dB Bandwidth : 400MHz @ CL=5pF
- Off isolation : -69dB @ 10MHz
- Low quiescent current : <1uA
- Break-before-make function
- ESD protection
  - HBM : ±8000V
  - MM : ±600V
- Small package SOT-363

### Applications

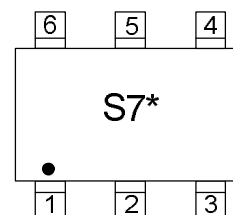
- Cell phones
- MID
- Other portable equipments



**SOT-363**



**Pin configuration (Top view)**



### Marking

- S7** = Device code  
**\*** = Month (A~Z)

### Order information

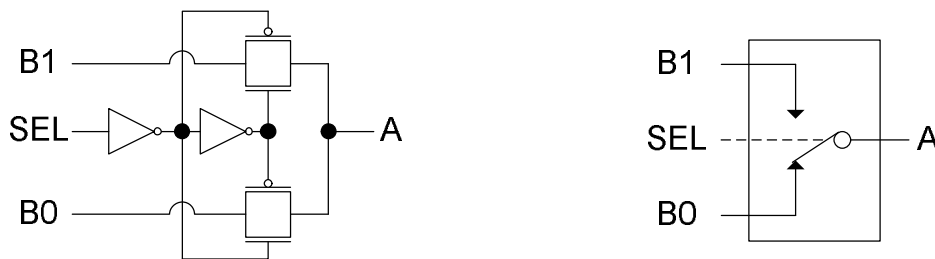
Device	Package	Shipping
WAS3157B-6/TR	SOT-363	3000/Reel&Tape

**Pin descriptions**

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

**Function descriptions**

Logic Level (SEL pin, Pin 6)	Function
L	B0 connected to A
H	B1 connected to A

**Logic diagram and symbol**

**Absolute maximum ratings**

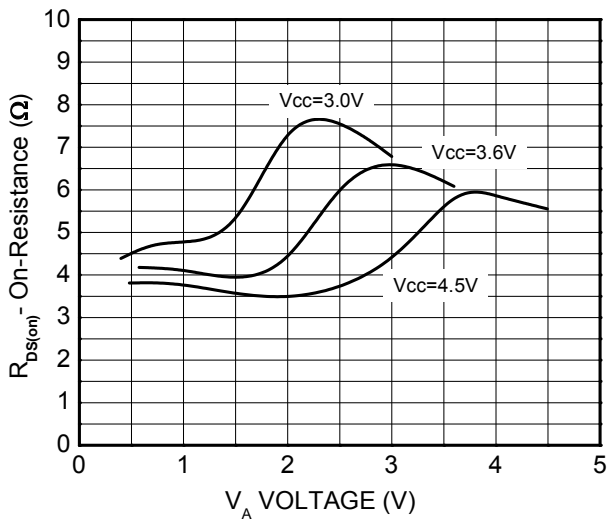
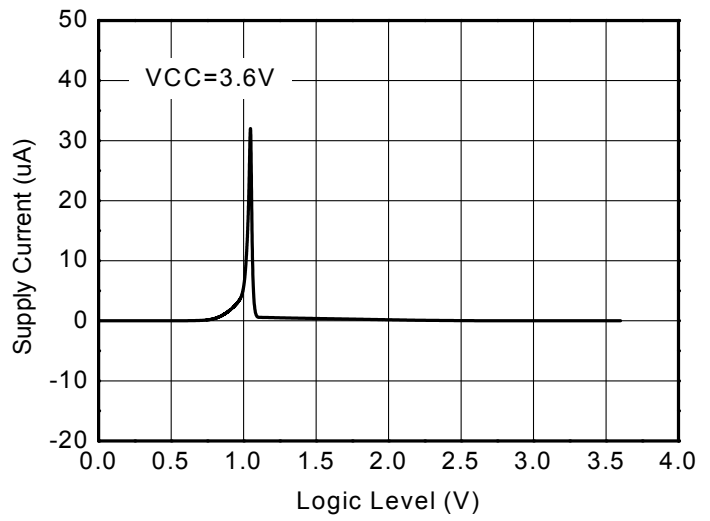
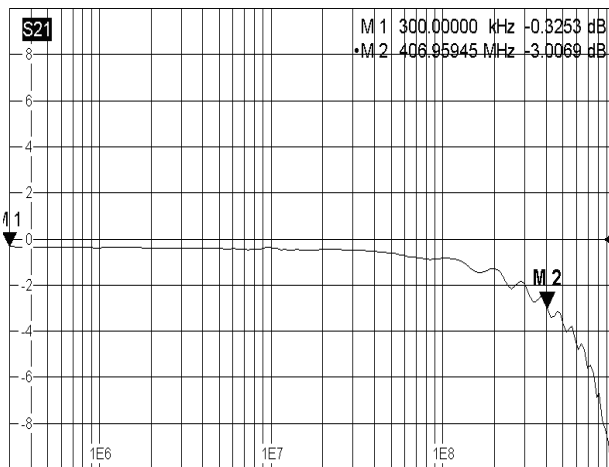
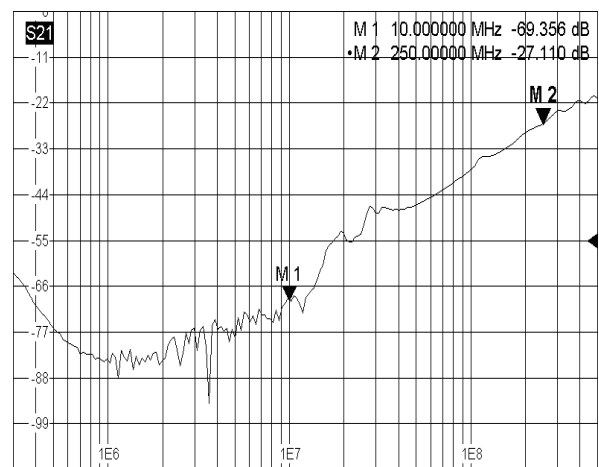
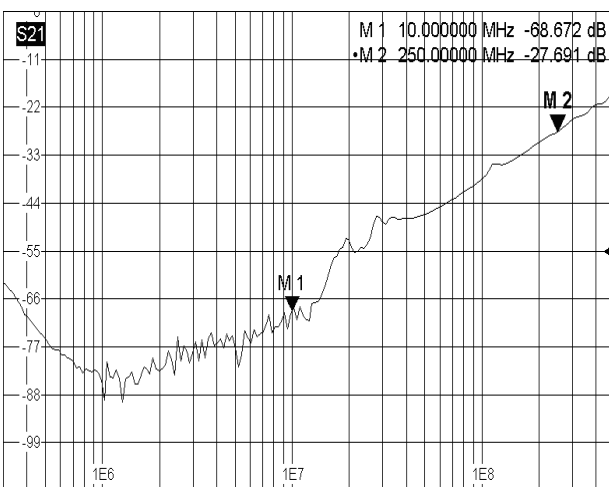
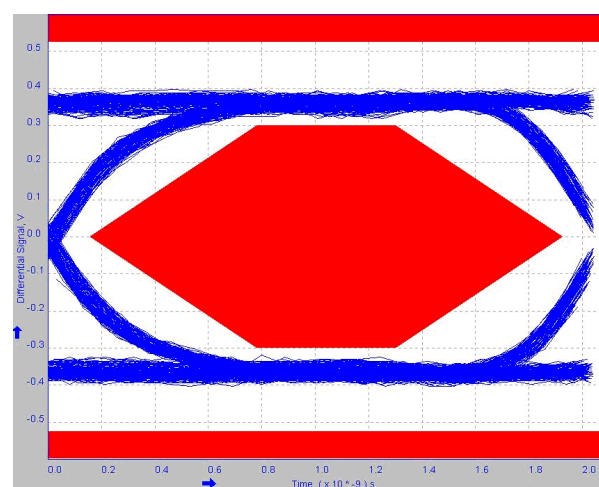
Parameter	Symbol	Value	Unit
Supply voltage range	VCC	-0.5 ~ 6.5	V
Data input/output voltage range	$V_{B0}, V_{B1}, V_A$	-0.5 ~ 6.5	V
Select input voltage range	$V_{SEL}$	-0.5 ~ 6.5	V
Continues current	$I_{B0}, I_{B1}, I_A$	±50	mA
Junction temperature range	$T_J$	150	°C
Lead temperature range	$T_L$	260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

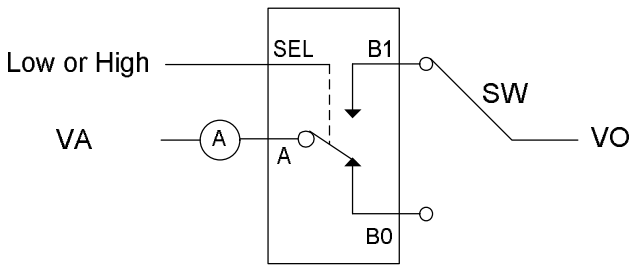
**Recommend operating ratings**

Parameter	Symbol	Value	Unit
Supply voltage range	VCC	2.3 ~ 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

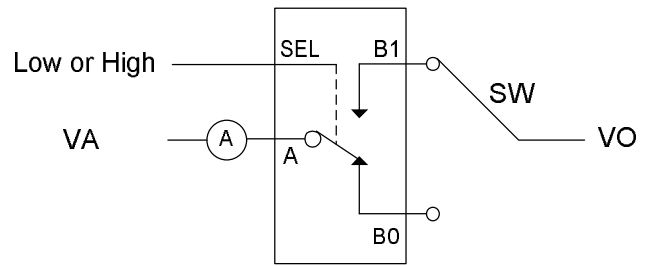
**Electronics Characteristics (Ta=25°C, VCC=4.5V, unless otherwise noted)**

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

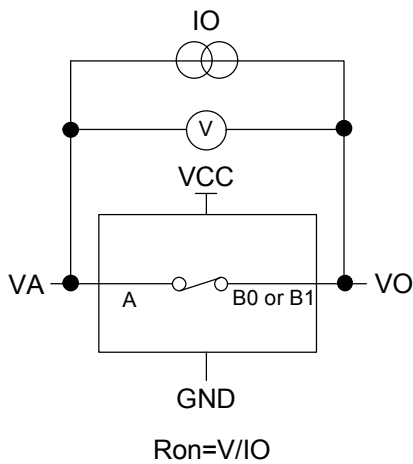
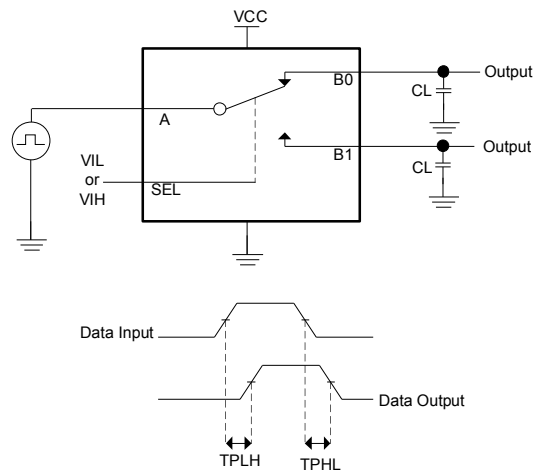
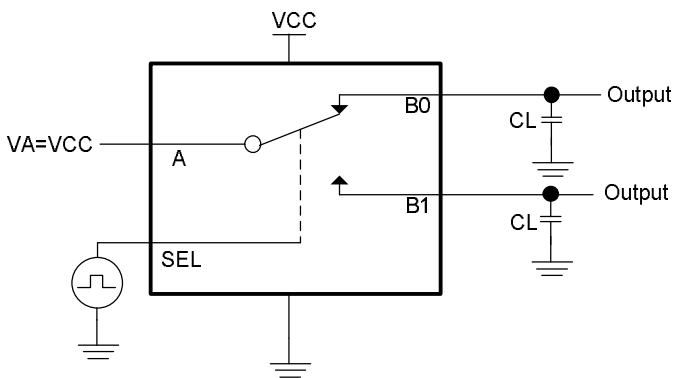
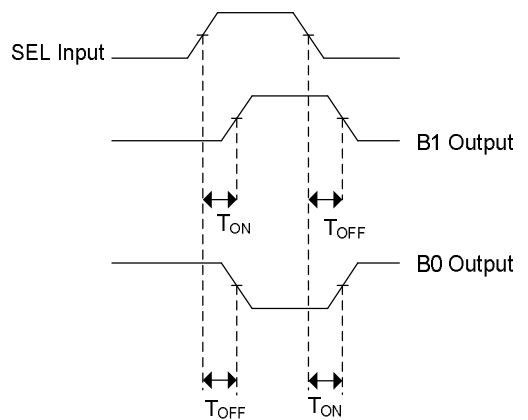
**Typical Characteristics (Ta=25°C, VCC=4.5V, unless otherwise noted)**

**On-Resistance vs. VCC, VA voltage**

**Supply current vs. Select logic level**

**Bandwidth**

**Off isolation**

**Crosstalk**

**Eye Diagram (480Mbps)**

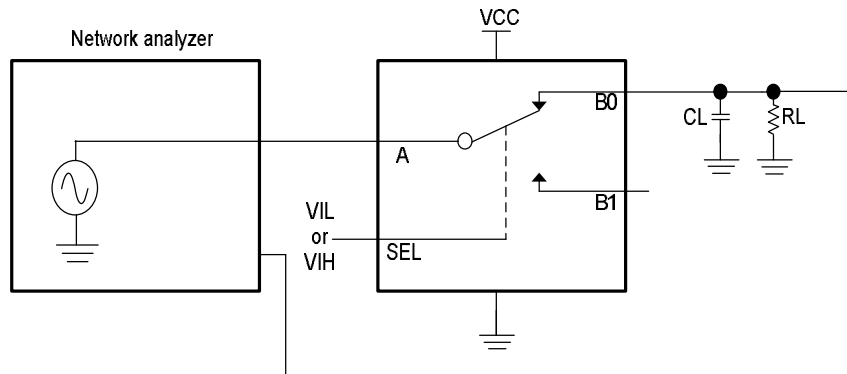
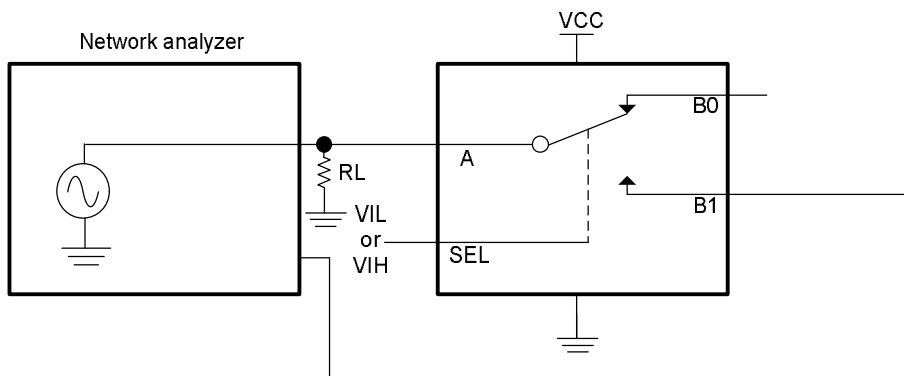
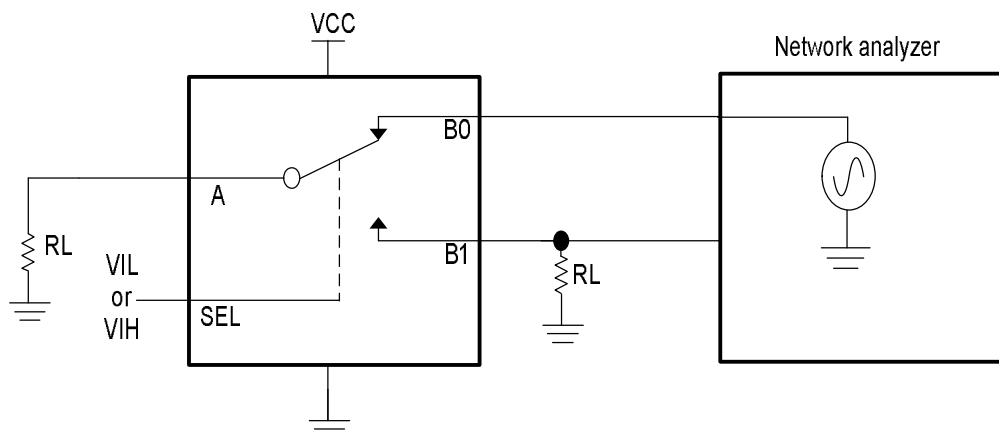
**Test Circuit**


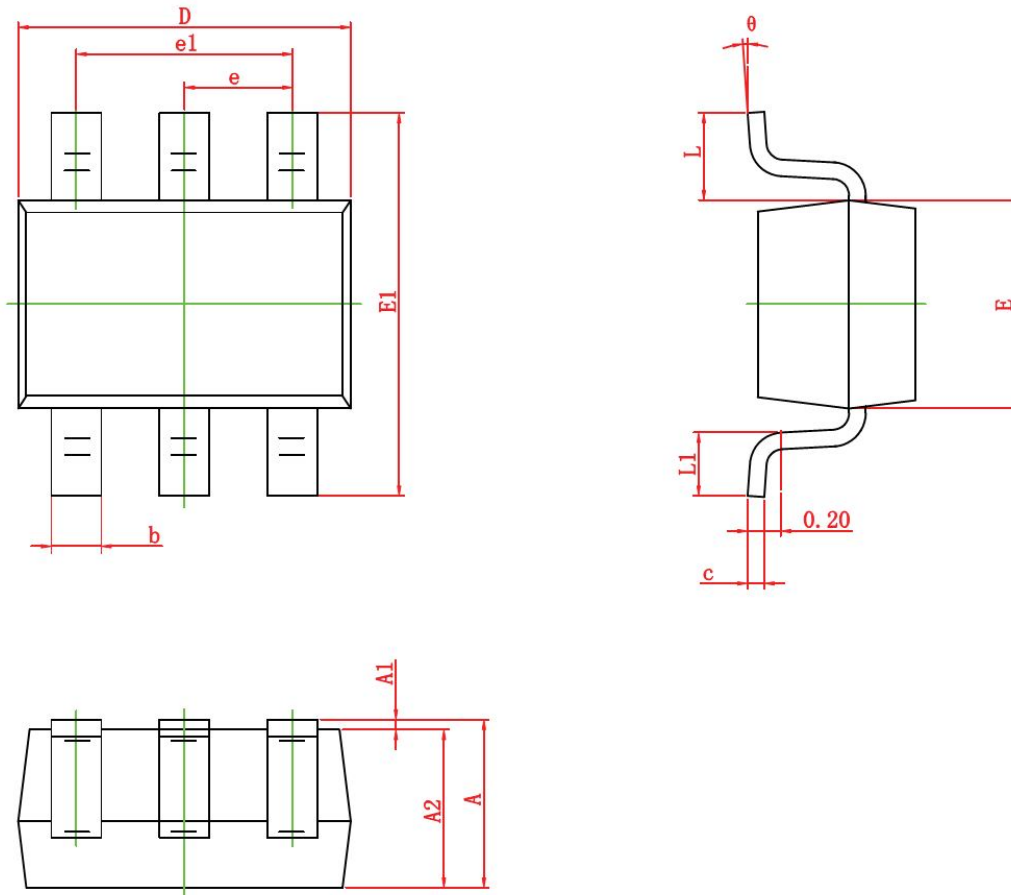
Conditions:  
 1: SEL=Low, SW=B1, VA=5.5V, VO=GND  
 3: SEL=High, SW=B0, VA=5.5V, VO=GND

**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**
**SOT-363**


Symbol	Dimension in Millimeters	
	Min.	Max.
A	0.900	1.100
A1	0.000	0.100
A2	0.900	1.000
b	0.150	0.350
c	0.080	0.150
D	2.000	2.200
E	1.150	1.350
E1	2.150	2.450
e	0.650 TYP	
e1	1.200	1.400
L	0.525 REF	
L1	0.260	0.460
$\theta$	0°	8°