







SINGLE-POLE DOUBLE-THROW ANALOG SWITCH

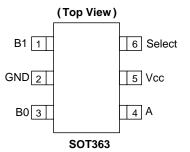
Description

The 74LVC1G3157 is a single-pole, double-throw analog switch. The device is designed for operation with a power supply range of 1.65V to 5.5V. The bidirectional switch can handle signal amplitudes between Vcc and Ground. The OFF state impedance of the switch is typically $50M\Omega$ while the ON state is typically 6Ω .

Features

- Wide Supply Voltage Range from 1.65 to 5.5V
- Control Pin Includes Hysteresis Allowing for Slower Input Rise and Fall Times
- CMOS Low Power Consumption
- Very Low ON-State Resistance
 - 7.5Ω (typical) at V_{CC} = 2.7V
 - 6.5Ω (typical) at $V_{CC} = 3.3V$
 - 6Ω (typical) at $V_{CC} = 4.5V$
- Break Before Make Switching
- Control Input accepts up to 5.5V Regardless of Vcc.
- Direct Interface with TTL Levels when V_{CC} = 3.3V
- ESD Protection Tested per JESD 22
 - Exceeds 200-V Machine Model (A115)
 - Exceeds 2,000-V Human Body Model (A114)
 - Exceeds 1,000-V Charged Device Model (C101)
- Latch-Up Exceeds 100mA per JESD 78, Class I
- Range of Package Options
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)

Pin Assignments





Packages not to scale

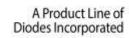
Applications

- Multiplexing of Analog Signals
- Multiplexing of Digital Signals
- Wide array of products such as:
 - Tablets, E-readers, Wearables
 - Cell Phones, Personal Navigation / GPS
 - MP3 Players, Cameras, Video Recorders
 - Computer Peripherals, Hard Drives, CD/DVD ROMs
 - TV, DVD, DVR, Set Top Boxes
 - PCs, Networking, Notebooks, Netbooks, PDAs

Notes:

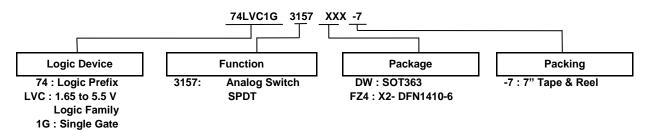
- 1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
- See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
- 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.







Ordering Information (Note 4)



Device	Package	Package	Package	7" Tape and R	Reel (Note 6)
Device	Code	(Note 5)	Size	Quantity	Part Number Suffix
74LVC1G3157DW-7	DW	SOT363	2.0mm x 2.0mm x 1.1mm 0.65 mm lead pitch	3,000/Tape & Reel	-7
74LVC1G3157FZ4-7	FZ4	X2-DFN1410-6	1.4mm x 1.0mm x 0.4mm 0.5 mm pad pitch	5,000/Tape & Reel	-7

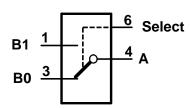
Notes: 4. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

- Pad layout as shown in Diodes Incorporated's package outline PDFs, which can be found on our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.
- 6. The taping orientation is located on our website at https://www.diodes.com/assets/Datasheets/ap02007.pdf.

Pin Descriptions

Pin Name	Description	
B1	Selectable Data I/0	
GND	Ground	
В0	Selectable Data I/0	
Α	Common Data I/0	
V _{cc}	Supply Voltage	
Select	Selection Pin	

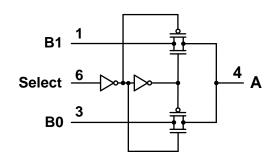
Logic Diagram



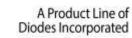
Function Table

Select	Status		
	B1 connected to A;		
П	B0 high impedance		
	B0 connected to A;		
L	B1 high impedance		

Simplified Schematic









Absolute Maximum Ratings (Note 7)

Symbol	Description	Rating	Unit
ESD HBM	Human Body Model ESD Protection	2	kV
ESD CDM	Charged Device Model ESD Protection	1	kV
ESD MM	Machine Model ESD Protection	200	V
V _{cc}	Supply Voltage Range	-0.5 to 6.5	V
V _{IN}	Input Voltage Range Applicable to Select Pin	-0.5 to 6.5	V
V _{SW}	Voltage Range Applicable to B0, B1, and A Pins	-0.5 to V _{CC} +0.5	V
I _{IK}	Input Clamp Current V _I <0 Applicable to Select Pin	-50	mA
I _{IO}	Continuous Current Applicable to B0,B1, and A Pins	±50	mA
I _{CC,} I _{GND}	Continuous current through V _{CC} or GND	±100	mA
TJ	Operating Junction Temperature	-40 to +150	°C
T _{STG}	Storage Temperature	-65 to +150	°C

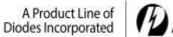
Note:

Recommended Operating Conditions

Symbol		Min	Max	Unit	
Vcc	Operating Voltage	Operating	1.65	5.5	V
V_{IN}	Select Input Voltage		0	5.5	V
V_{SW}	Switch Voltage (applicable to pir	ns B0,B1,A)	-0.2	V _{cc}	V
A.//A.>./	Input Transition Rise or Fall	V _{CC} = 1.65 to 2.7V	-	20	0.4
ΔΰΔν	At/ΔV Rate – Select Pin	V _{CC} = 2.7V to 5.5V	-	10	ns/V
T _A	Operating Free-Air Temperature	-	-40	+125	°C

^{7.} Stresses beyond the absolute maximum may result in immediate failure or reduced reliability. These are stress values and device operation should be within recommend values.





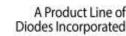


Electrical Characteristics (All typical values are at, $T_J = +25$ °C)

				T _A	= -40 to +85°	C	T _A = -40	to +125°C	
Symbol	Parameter	Test Condition	V _{cc} (V)	Min	Typical (Note 8)	Max	Min	Max	Unit
			1.65 to 1.95	0.65V _{CC}	-	-	0.65V _{CC}	-	
V	High Level		2.3 to 2.7	1.7	-	-	1.7	-	v
V_{IH}	Input Voltage Select Pin	-	3 to 3.6	2.0	-	-	2.0	-	V
			4.5 to 5.5	0.7V _{CC}	-	-	0.7V _{CC}	-	
			1.65 to 1.95	-	-	0.35V _{CC}	-	0.35V _{CC}	
V _{IL}	Low Level Input Voltage		2.3 to 2.7	-	-	0.7	-	0.7	V
VIL	Select Pin	-	3 to 3.6	-	-	0.8	-	0.8	V
			4.5 to 5.5	-	-	0.3V _{CC}	-	0.3V _{cc}	
I _{IN}	Input Leakage Current Select Pin	0 ≤ Select ≤ 5.5V	0 to 5.5	-	±0.05	±1	-	±10	μA
I _{S(OFF)}	OFF State Leakage Current	0V ≤ A, B _n ≤ V _{CC} Figure 1	1.65 to 5.5	-	±0.05	±1	-	±10	μA
I _{S(ON)}	ON State Leakage Current	$0V \le A, B_n \le V_{CC}$ Figure 2	1.65 to 5.5	-	±0.05	±1	-	±10	μA
I _{S(ON)}	ON State Leakage Current	$-0.1V \le A, B_n \le V_{CC}$ Figure 2	1.65 to 5.5	-	±0.05	±2	-	±20	μA
I _{cc}	Quiescent Supply Current	Select = V_{CC} or GND A, Bn = V_{CC} or GND $I_{OUT} = 0$	5.5	-	1.0	10	-	40	μA
Δl _{CC}	Additional Supply Current	Select= $V_{CC} - 0.6V$ A, $B_n = V_{CC}$ or GND $I_{OUT} = 0$	5.5	-	30	500	-	5,000	μA
Cı	Input Capacitance Select Pin	-	3.3	-	2.5	-	-	-	pF
C _{S(OFF)}	OFF State Capacitance	Select = V_{CC} or GND A, $B_n = V_{CC}$ or GND $I_{OUT} = 0$	3.3	-	6.0	-	-	-	pF
C _{S(ON)}	ON State Capacitance	Select = V_{CC} or GND A, $B_n = V_{CC}$ or GND $I_{OUT} = 0$	3.3	-	18	-	-	-	pF

Note: 8. Typical performance information is included in figures 11 to 34 on pages 11 to 14.







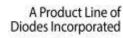
Electrical Characteristics (All typical values are at T_J = +25°C)

Symbol Dayamatan		Test Condition		T,	4 = -40 to +85	°C	T _A = -40) to +125°C		
Symbol	Parameter	(Note 9)	V _{cc} (V)	Min	Тур	Max	Min	Max	Unit	
		$V_1 = 0V$, $I_0 = 4mA$	1.65	-	12.5	18	-	27		
		$V_1 = 1.65V, I_0 = -4mA$	1.65	-	14	18	-	35		
		$V_1 = 0V$, $I_0 = 8mA$	2.3	-	9.0	16	-	24		
		$V_1 = 2.3V, I_0 = -8mA$	2.3	-	9.0	2016	-	30		
		$V_1 = 0V, I_0 = 12mA$	0.7	-	8.0	14	-	21		
R _{on}	ON Resistance	$V_1 = 2.7V, I_0 = -12mA$	2.7	-	8.0	14	-	27	Ω	
		$V_1 = 0V, I_0 = 24mA$	0.0	-	7.0	12	-	18		
		V _I = 3.0V, I _O =-24mA	3.0	-	7.0	12	-	23		
		$V_1 = 0V, I_0 = 32mA$		-	5.5	10	-	15		
		V _I = 2.7V, I _O =-32mA	4.5	-	6.0	12	-	17		
		V _I = 4.5V, I _O =-32mA		-	5.5	10	-	15		
			$I_A = 4mA$, $0 \le V_{BN} \le V_{CC}$	1.65	-	34	130	-	195	
	On	$I_A = 8mA$, $0 \le V_{BN} \le V_{CC}$	2.3	-	5	30	-	45	Ω	
R _{RANGE}	Resistance Over Signal	$I_A = 12mA$, $0 \le V_{BN} \le V_{CC}$	2.7	-	4	25	-	38		
	Range	$I_A = 24mA$, $0 \le V_{BN} \le V_{CC}$	3.0	-	7.8	20	ı	30		
		$I_A = 32\text{mA}, \ 0 \le V_{BN} \le V_{CC}$	4.5	-	6.2	15	-	23		
		$I_A = -4mA$, $V_{BN} = 1.15 \text{ V}$	1.65	-	0.25	-	i	-		
	On Resistance	I _A = -8mA, V _{BN} = 1.6 V	2.3	-	0.25	-	-	-		
ΔR_{ON}	Match Between	I _A = -12mA, V _{BN} = 1.9 V	2.7	-	0.25	-	-	-	Ω	
	Channels (Note 10)	$I_A = -24\text{mA},$ $V_{BN} = 2.1$	3.0	-	0.25	-	-	-		
		$I_A = -32mA,$ $V_{BN} = 3.15$	4.5	-	025	-	-	-		
		$I_A = -4mA$, $0 \le V_{BN} \le V_{CC}$	1.65	-	26	110	-	150		
	On	$I_A = -8mA$, $0 \le V_{BN} \le V_{CC}$	2.3	-	5.0	26	-	105		
R _{flat}	Resistance Flatness	$I_A = -24$ mA, $0 \le V_{BN} \le V_{CC}$	2.7	-	3.5	16	-	35	Ω	
	(Note 11)	$I_A = -24$ mA, $0 \le V_{BN} \le V_{CC}$	3.3	-	2.0	9	-	15	1	
		$I_A = -32\text{mA}, \ 0 \le V_{BN} \le V_{CC}$	5.0	-	1.5	4	-	8		

Note: 9. Switch resistance test is measured per Figure 3.

^{10.} ΔR_{ON} is measured at identical $V_{CC},$ temperature and voltage levels.

^{11.} Flatness is defined as the difference between the maximum and minimum of ON resistance measured at identical V_{CC} and temperature.





Switching Characteristics

Symbol	Parameter	Test Condition	Vcc	T _A =	= -40 to +	-85°C		-40 to 25°C	Unit	Figure
Syllibol	Parameter	rest Condition	Volts	Min	Тур	Max	Min	Max	Onn	Number
			1.65 to 1.95	-	-	2.0	-	3.0		
	Dranagation		2.3 to 2.7	-	-	1.2	-	2.0		
t _{PHL} t _{PLH}	Propagation Delay	V _I = OPEN (Note 12)	2.7	-	-	1.0	-	1.5	ns	Figure 4
1211	A to B _n	,	3.0 to 3.6	-	-	0.8	-	1.5		
			4.5 to 5.5	-	-	0.6	-	1.0		
			1.65 to 1.95	1.0	8.7	14.0	1.0	14.0		
	Output	V 2xV fort	2.3 to 2.7	1.0	5.3	7.5	1.0	7.5		
t _{PZL} t _{PZH}	Enable Time	$V_I = 2 \times V_{CC}$ for t_{PZL} $V_I = 0V$ for t_{PZH}	2.7	1.0	4.9	6.0	1.0	6.0	ns	Figure 4
1211	Switch to B _n	(Note 13)	3.0 to 3.6	0.5	4.0	5.5	0.5	5.5		
			4.5 to 5.5	0.5	3.0	4.0	0.5	4.0		
			1.65 to 1.95	2.5	6.0	8.5	2.5	8.5	8.5 8.2 8.0 ns 7.8 7.5	
	Output	$V_I = 2 \times V_{CC}$ for t_{PLZ} $V_I = 0V$ for t_{PHZ} (Note 13)	2.3 to 2.7	2.0	4.4	8.2	2.0	8.2		Figure 4
t _{PLZ} t _{PHZ}	Disable Time		2.7	1.5	4.2	8.0	1.5	8.0		
1112	Switch to B _n		3.0 to 3.6	1.5	3.6	7.8	1.5	7.8		
			4.5 to 5.5	0.8	2.9	7.5	0.8	7.5		
			1.65 to 1.95	0.5	-		0.5	-		
	Break Before		2.3 to 2.7	0.5	-	-	0.5	-		
t _{B-M}	Make Time	-	2.7	0.5	-	-	0.5	-	ns	Figure 5
	(Note 9)		3.0 to 3.6	0.5		-	0.5	-		
			4.5 to 5.5	0.5	-	-	0.5			
	Charge	$C_L = 0.1 \text{ nF},$ $V_{GEN} = 0V$	5.0	-	7.0	-	-	-		F: 0
Q	Injection (Note 9)	$R_{GEN} = 0$ Ω	3.3		3.0	-	-	-	рC	Figure 6
QIRR	Off Isolation (Note 11)	$R_L = 50 \Omega$, f = 10MHz	1.65 ~ 5.5	-	-42	-	-	-	dB	Figure 7
Xtalk	Crosstalk	$R_L = 50 \Omega$, $f = 10MHz$	1.65 ~ 5.5	-	-42	-	-	-	dB	Figure 8
BW	-3dB Bandwidth	$R_L = 50 \Omega$	1.65 ~ 5.5	-	300	-	-	-	MHz	Figure 9
THD	Total Harmonic Distortion (Note 9)	$R_L = 600 \ \Omega, \ 0.5 \ V_{P-P},$ $f = 600 Hz \ to \ 20 kHz$	5.0	-	0.1	-	-	-	%	Figure 10

Notes:

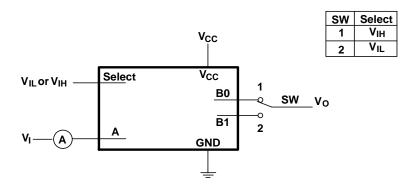
^{12.} Due to the symmetry of the part, the direction of the propagation delay applies to either direction A to B_n or B_n to A. Propagation time is the calculated RC time constant of the typical ON resistance of the switch and the specified load capacitance when capacitance when driven by an ideal voltage source.

13. The Switch signal enable and disables time are the same for Bn and A if they are reversed at input and output.





Parameter Measurement Information



Condition 1: $V_I = GND, V_O = V_{CC}$ Condition 2: $V_I = V_{CC}, V_O = GND$

Figure 1 OFF -State Leakage Curent Test

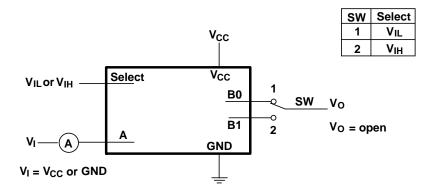


Figure 2 ON -State Leakage Curent Test

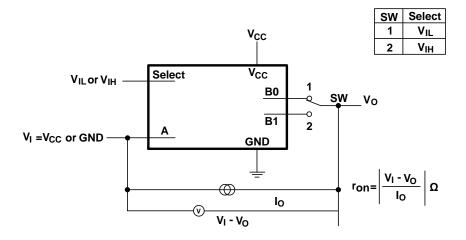
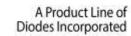


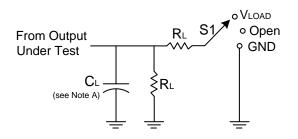
Figure 3 ON State Resistance Test





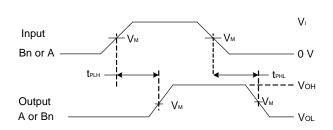


Parameter Measurement Information (Notes 15-19)

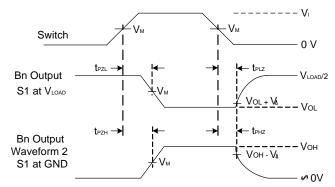


TEST	S1	RL
t _{PLH} /t _{PHL}	Open	500Ω
t _{PLZ} /t _{PZL}	Vload	500Ω
t _{PHZ} /t _{PZH}	GND	500Ω

V	In	puts	V	V	C _L	V/A
V _{CC}	VI	t _r /t _f	V _M	V _{LOAD}	(Note 14)	V Δ
1.8V ± 0.15V	V _{CC}	≤2ns	V _{CC} /2	2 x V _{CC}	50pF	0.1V
2.5V ± 0.2V	V _{CC}	≤2ns	V _{CC} /2	2 x V _{CC}	50pF	0.1V
3.3V ± 0.3V	Vcc	≤2.5ns	V _{CC} /2	2 x V _{CC}	50pF	0.1V
5V ± 0.5V	Vcc	≤2.5ns	V _{CC} /2	2 x V _{CC}	50pF	0.1V



Voltage Waveform Propagation Delay Times



Voltage Waveform Enable and Disable Times

Figure 4 Load Circuit and Voltage Waveforms

Notes:

- 14. Includes test lead and test apparatus capacitance.
 15. All pulses are supplied at pulse repetition rate ≤ 10MHz.
 16. Inputs are measured separately one transition per measurement.
- 17. tpLZ and tpHZ are the same as tdis.
- 18. tpzL and tpzH are the same as tEN.
- 19. t_{PLH} and t_{PHL} are the same as $t_{PD.}$





Parameter Measurement Information (Continued)

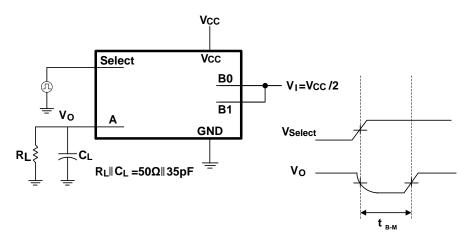


Figure 5 Break before Make Timing Test

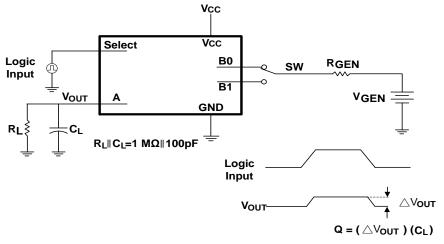


Figure 6 Charge Injection

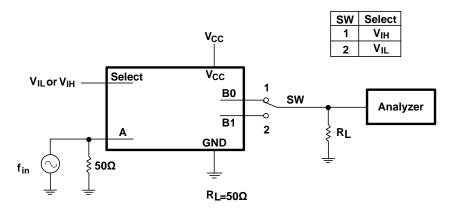


Figure 7 OFF Isolation





Parameter Measurement Information (Cont.)

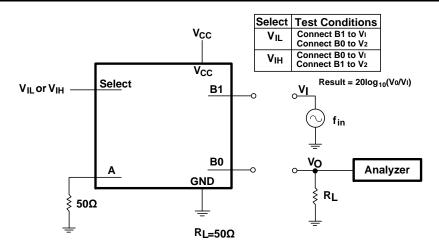
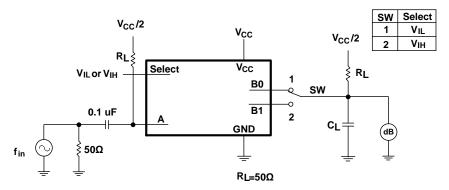


Figure 8 Cross Talk



Adjust fin voltage to obtain 0 dBm level at input. Adjust fin frequency until dB meter reads -3 dB.

Figure 9 Bandwdith

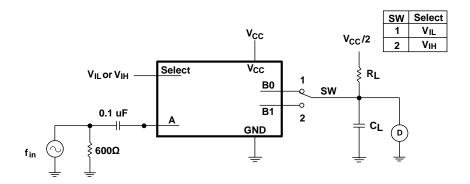


Figure 10 THD





Typical Performance Characteristics

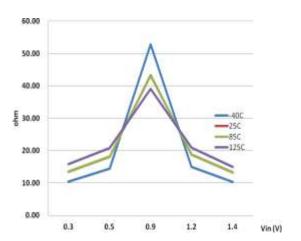


Figure 11 ON state Resistance Vcc = 1.65 V; I_{Bn} = 4ma

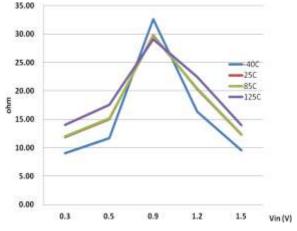


Figure 12 ON state Resistance Vcc = 1.8 V; I_{Bn} = 4ma

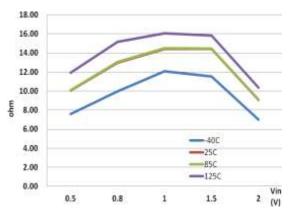


Figure 13 ON state Resistance Vcc = 2.3 V; I_{Bn} = 8ma

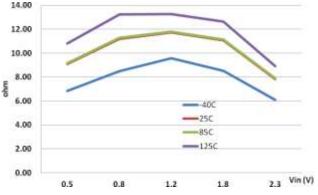


Figure 14 ON state Resistance Vcc = 2.5 V; I_{Bn} = 8ma

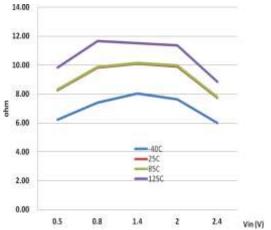


Figure 15 ON state Resistance Vcc = 2.7 V; I_{Bn} = 12ma

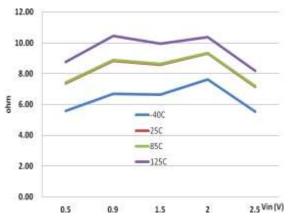
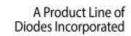


Figure 16 ON state Resistance Vcc = 3 V; I_{Bn} = 24ma







Typical Performance Characteristics (Continued)

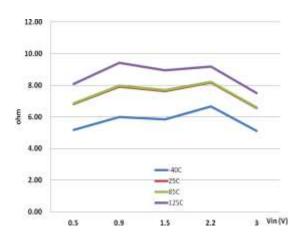


Figure 17 ON state Resistance Vcc = 3.3 V; I_{Bn} = 24ma

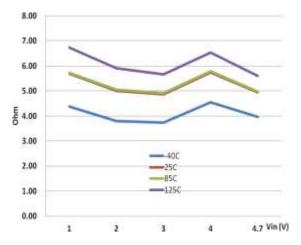


Figure 19 ON state Resistance Vcc = 5.5 V; I_{Bn} = 32ma

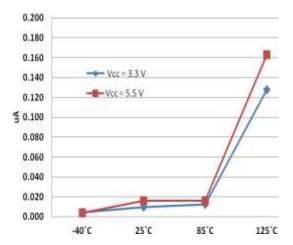


Figure 21 $I_{S(OFF)}$ OFF state leakage $V_{IN} = 0 \text{ V}$

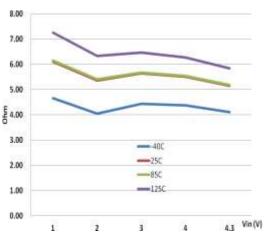


Figure 18 ON state Resistance Vcc = 4.5 V; I_{Bn} = 32ma

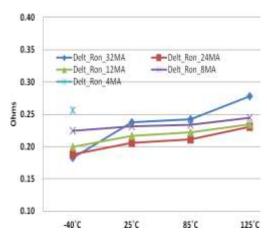


Figure 20 Ann-Resistance Match Between Channels

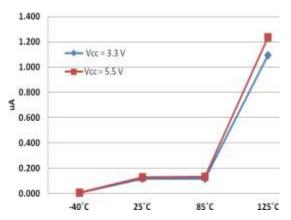


Figure 22 I_{S(OFF)} OFF state leakage V_{IN} = -0.1 V





Typical Performance Characteristics (Cont.)

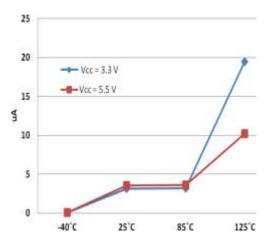


Figure 23 $I_{S(OFF)}$ OFF state leakage V_{IN} = -0.2 V

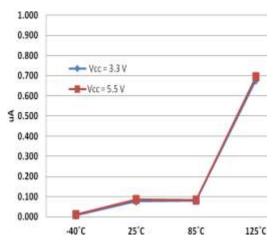


Figure 25 $I_{S(ON)}$ ON state leakage $V_{IN} = -0.1 \text{ V}$

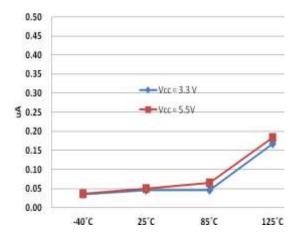


Figure 27 I_{CC} verses Temperture

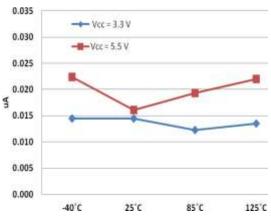


Figure 24 $I_{S(ON)}$ ON state leakage $V_{IN} = 0 \text{ V}$

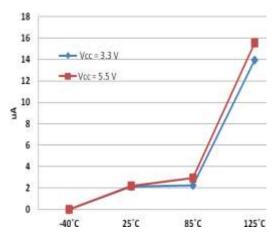


Figure 26 $I_{S(ON)}$ ON state leakage V_{IN} = -0.2V

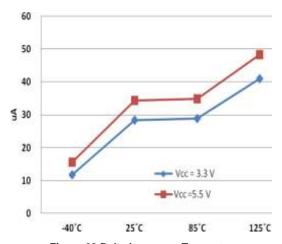


Figure 28 Delta I_{CC} verses Temperture







Typical Performance Characteristics (Cont.)

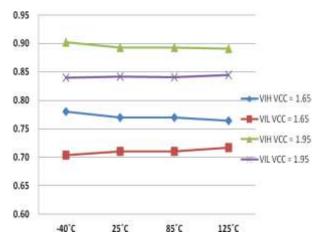


Figure 29 V_{IH} , V_{IL} , Hysteresis V_{CC} = 1.65 V and V_{CC} = 1.95 V

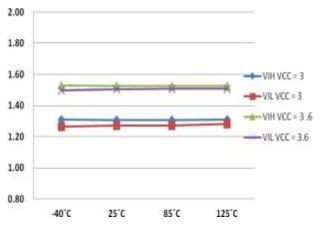


Figure 31 V_{IH} , V_{IL} , Hysteresis V_{CC} = 3 V and V_{CC} = 3.3 V

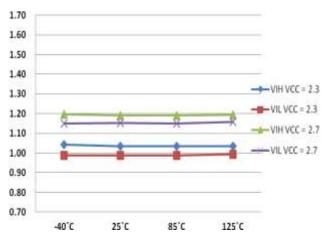


Figure 30 V_{IH} , V_{IL} , Hysteresis V_{CC} = 2.3 V and V_{CC} = 2.7 V

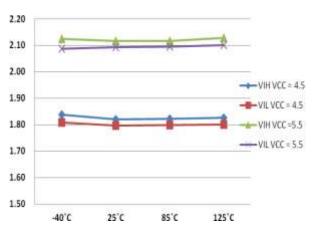
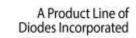


Figure 32 V_{IH} , V_{IL} , Hysteresis V_{CC} = 4.5 V and V_{CC} = 5.5 V

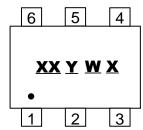






Marking Information

(1) SOT363



XX: Identification code

Y: Year 0~9

W: Week: A~Z: 1~26 week;

a~z: 27~52 week; z represents

52 and 53 week

X: A~Z: Internal Code

Part Number	Package	Identification Code
74LVC1G3157DW	SOT363	J7

X2-DFN1410-6

(Top View)

XX<u>Y W X</u> XX: Identification Code

Y : Year 0~9 W : Week : A~Z : 1~26 week; a~z: 27~52 week; z represents 52 and 53 week X: A~Z: Internal Code

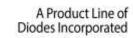
Part Number	Package	Identification Code
74LVC1G3157FZ4	X2-DFN1410-6	J7

Package Characteristics (All typical values are at $V_{CC} = 3.3V$, $T_A = +25$ °C)

Symbol	Parameter	Test Conditions	V _{cc}	Min	Тур.	Max	Unit
θ_{JA}	Thermal Resistance	SOT363	(Note 20)	Ī	371	-	°C/W
	Junction-to-Ambient	X2-DFN1410-6		-	460	-	
θ _{JC}	Thermal Resistance	SOT363	(Note 20)	-	143	-	°C/W
	Junction-to-Case	X2-DFN1410-6		-	265	-	

Note: 20. Test condition SOT363, and X2-DFN1410-6: Device mounted on FR-4 substrate PC board, 2oz. copper, with minimum recommended pad layout.

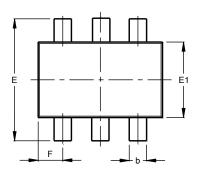


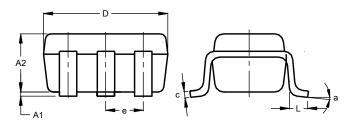




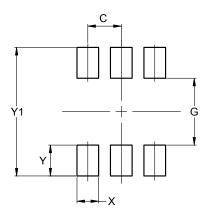
SOT363 Package Outline Dimensions and Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.



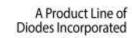


SOT363				
Dim	Min	Max	Тур	
A1	0.00	0.10	0.05	
A2	0.90	1.00	1.00	
b	0.10	0.30	0.25	
С	0.10	0.22	0.11	
D	1.80	2.20	2.15	
Е	2.00	2.20	2.10	
E1	1.15	1.35	1.30	
е	0.650 BSC			
F	0.40	0.45	0.425	
L	0.25	0.40	0.30	
а	0°	8°		
All Dimensions in mm				



Dimensions	Value (in mm)	
С	0.650	
G	1.300	
Х	0.420	
Y	0.600	
Y1	2.500	

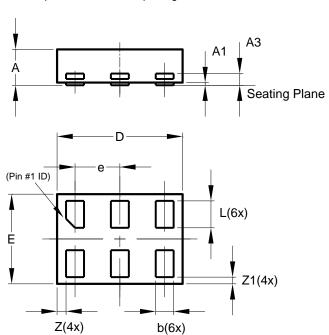




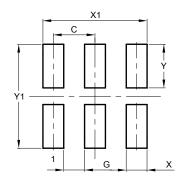


X2-DFN1410-6 Package Outline Dimensions and Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.



X2-DFN1410-6				
Dim	Min	Max	Тур	
Α		0.40	0.39	
A1	0.00	0.05	0.02	
A3	_		0.13	
b	0.15	0.25	0.20	
D	1.35	1.45	1.40	
Е	0.95	1.05	1.00	
е	_	_	0.50	
L	0.25	0.35	0.30	
Z			0.10	
Z 1	0.045	0.105	0.075	
All Dimensions in mm				



Dimensions	Value	
Dilliensions	(in mm)	
С	0.500	
G	0.250	
Х	0.250	
X1	1.250	
Y	0.525	
Y1	1.250	





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