WJ3157

4Ω, Low Voltage, SPDT Analog Switch

1. General Description

The WJ3157 is a single, bidirectional, single-pole/double-throw (SPDT) CMOS analog switch that is designed to operate from a single +1.8V to +5.5V supply. It features high-bandwidth and low on-resistance. Targeted applications for audio switching.

The WJ3157 features guaranteed on-resistance matching between switches and guaranteed on-resistance flatness over the signal range. This ensures excellent linearity and low distortion when switching audio signals.

The WJ3157 is available in Green SOT363 package, SOT23-6 package and DFN1*1.45-6 package.

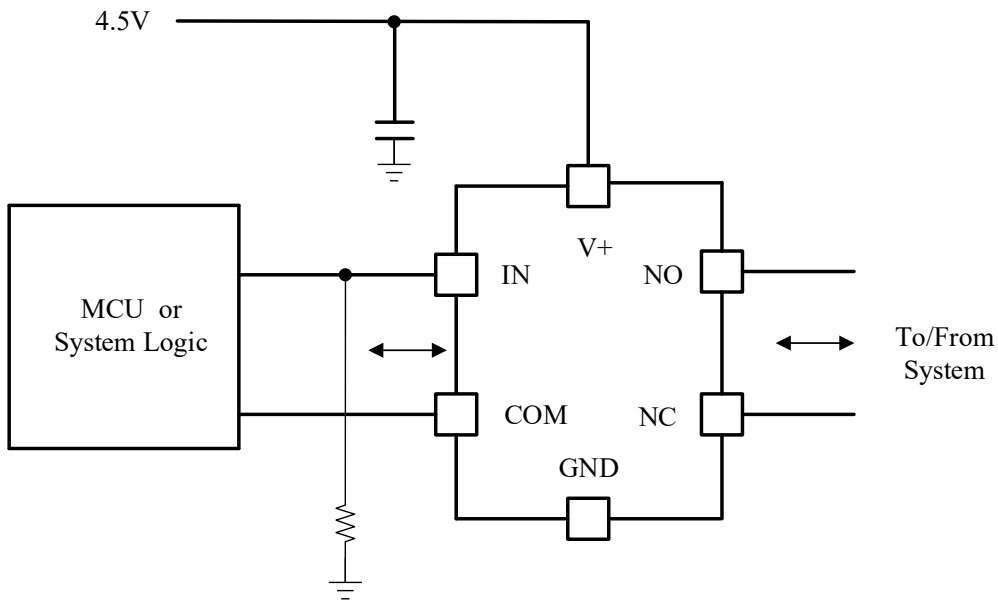
2. Features

- Single Supply Voltage Range: 1.8V to 5.5V
- Low On-Resistance: 4Ω (TYP) at V+ =4.5V
- Fast Switching Times:
- t_{ON}: 30ns (TYP)
- t_{OFF}: 20ns (TYP)
- High Bandwidth: 300MHz
- Rail-to-Rail Operation
- TTL/CMOS Compatible
- Break-Before-Make Switching
- -40°C to +85°C Operating Temperature Range
- Available in a Green SOT363 Package, SOT23-6 package and DFN1*1.45-6 package

3. Applications

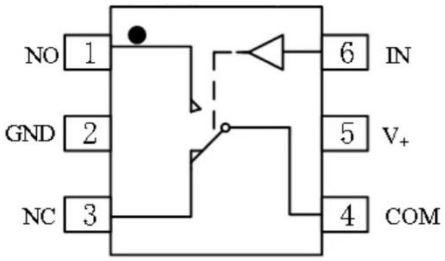
- Portable Instrumentation
- Battery-Operated Equipment
- Computer Peripherals
- Cell Phones
- PDAs
- MP3s

4. Typical Application Circuit

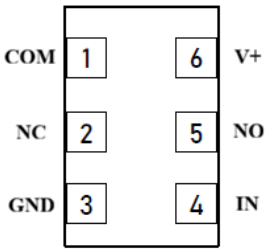


5. Pin Configuration

(Top View)



SOT363/SOT23-6



DFN1*1.45-6

6. Pin Description

PIN NUMBER		PIN NAME	PIN FUNCTION
SOT363 SOT23-6	DFN1*1.45-6		
1	5	NO	Normally-Open pin
2	3	GND	Ground
3	2	NC	Normally-Closed pin
4	1	COM	Common pin
5	6	V+	Positive power supply pin
6	4	IN	Digital control pin to connect the COM pin to the NO or NC pin

7. Function Table

LOGIC	NO	NC
0	OFF	ON
1	ON	OFF

8. Absolute Maximum Ratings

Operating free-air temperature range (unless otherwise noted)[1]

PARAMETER	RATING	UNIT
V+, IN to GND	-0.3~+6	V
Analog, Digital Voltage Range [2]	-0.3~(V+)+0.3	V
Continuous Current NO, NC, or COM	±50	mA
Peak Current NO, NC, or COM	±80	mA
Junction Temperature	+150	°C
Storage Temperature Range	-65~+150	°C
Operating Ambient Temperature	-40~+85	°C
Lead Temperature (Soldering, 10s)	260	°C
Electrostatic Discharge(HBM)	4000	V
Electrostatic Discharge(CDM)	1000	V

NOTE1: Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTE2: Signals on NC, NO, or COM exceeding V+ will be clamped by internal diodes. Limit forward diode current to maximum current ratings.

9. Recommended Operating Conditions

SYMBOL	PARAMETER	RATING	UNIT
V_S	Switch Input/Output Voltage	0~V+	V
V_{CC}	Supply Voltage	1.8~5.5	V
V_{IN}	Control Input Voltage	0~5.5	V
T_A	Operating Temperature	-40~+85	°C

10. Electrical Characteristics

(V+ = 4.5 V, T_A=25°C, unless otherwise noted)

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP.	MAX	UNIT
ANALOG SWITCH						
V_{NO} V_{NC} V_{COM}	Analog Signal Range		0	-	V+	V
R_{ON}	On-Resistance	V_{NO} or V_{NC}=0V to 4.5V[1] I_{COM}=-10mA, Test Circuit 1		4	8	Ω
		T_A=-40°C to +85°C			8.5	Ω
$\triangle R_{ON}$	On-Resistance Match Between Channels	V_{NO} or V_{NC}=0V to 4.5V[1] I_{COM}=-10mA, Test Circuit 1		0.15	0.4	Ω
		T_A=-40°C to +85°C			0.5	Ω
$R_{FLAT(ON)}$	On-Resistance Flatness	V_{NO} or V_{NC}=0V to 4.5V[1] I_{COM} =-10mA, Test Circuit 1		2	3	Ω
		T_A=-40°C to +85°C			4	Ω
LEAKAGE CURRENTS						
$I_{NC(OFF)}$ $I_{NO(OFF)}$	Source OFF Leakage Current	V+=5.5V V_{NO} or V_{NC}=1.0V, 4.5V V_{COM} = 4.5V,1.0V T_A=-40°C to +85°C			1	μA
$I_{NC(ON)}$ $I_{NO(ON)}$ $I_{COM(ON)}$	Channel ON Leakage Current	V+=5.5V, V_{COM}=1.0V,4.5V V_{NO} or V_{NC}=1.0V,4.5V T_A=-40°C to +85°C			1	μA
DIGITAL INPUTS						
V_{INH}	Input High Voltage	V+=4.5V, T_A=-40°C to +85°C	2.0			V
V_{INL}	Input Low Voltage	V+=4.5V, T_A=-40°C to +85°C			0.4	V
I_{IN}	Input Leakage Current	V+=+5.5V, V_{IN}=0V or 5.5V T_A=-40°C to +85°C			1	μA

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP.	MAX	UNIT
DYNAMIC CHARACTERISTICS						
t_{ON}	Turn-On Time	V_{NO} or V_{NC}=3.0V R_L=300Ω, C_L=35pF Test Circuit 2		30		ns
t_{OFF}	Turn-Off Time	V_{NO} or V_{NC}=3.0V R_L=300Ω, C_L=35pF Test Circuit 2		20		ns
t_D	Break-Before-Make Delay Time	V_{NO} or V_{NC}=3.0V R_L=300Ω, C_L=35pF Test Circuit 3		5		ns
t_{PD}	Propagation Delay Time	R_S=39Ω, C_L=50pF, Test Circuit 4		5		ns
O_{ISO}	Off Isolation	R_L=50Ω, C_L=5pF, Signal=0dBm Test Circuit 5, f=10kHz		-50		dB
		R_L=50Ω, C_L=5pF, Signal=0dBm Test Circuit 5, f=1kHz		-70		dB
POWER REQUIREMENTS						
BW	-3dB Bandwidth	Signal=0dBm, R_L=50Ω, C_L=5pF Test Circuit 6		300		MHz
$C_{NC(OFF)}$ $C_{NO(OFF)}$	Source off Capacitance	f=1MHz		5.6		pF
$C_{NC(ON)}$ $C_{NO(ON)}$ $C_{COM(ON)}$	Channel on Capacitance	f=1MHz		15.6		pF
V+	Power Supply Range		1.8		5.5	V
I+	Power Supply Current	V+=+5.5V, V_{IN}=0V or V+ T_A=-40°C to +85°C			2	μA

NOTE1: V_{NC} or V_{NO}=0V,0.5V,1V,1.5V,2V,2.5V,3V,3.5V,4V,4.5V.

11. Electrical Characteristics

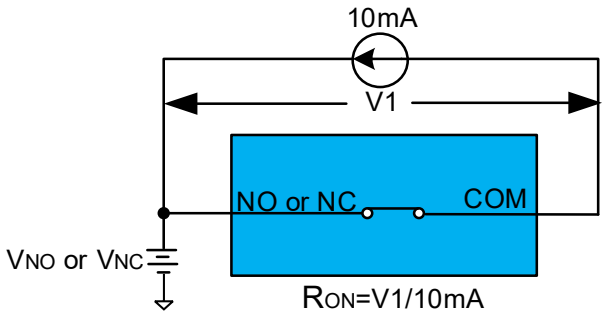
(V+ = 2.7 V, T_A=25°C, unless otherwise noted)

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP.	MAX	UNIT
ANALOG SWITCH						
V_{NO} V_{NC} V_{COM}	Analog Signal Range		0	-	V+	V
R_{ON}	On-Resistance	V_{NO} or V_{NC}=0V to 2.7V[1] I_{COM}=-10mA, Test Circuit 1		7		Ω
		T_A=-40°C to +85°C		8		Ω
$\triangle R_{ON}$	On-Resistance Match Between Channels	V_{NO} or V_{NC}=0V to 2.7V[1] I_{COM}=-10mA, Test Circuit 1		0.2		Ω
		T_A=-40°C to +85°C		0.4		Ω
$R_{FLAT(ON)}$	On-Resistance Flatness	V_{NO} or V_{NC}=0V to 2.7V[1] I_{COM} =-10mA, Test Circuit 1		3		Ω
		T_A=-40°C to +85°C		5		Ω
$I_{NC(OFF)}$ $I_{NO(OFF)}$	Source OFF Leakage Current	V+=3.6V V_{NO} or V_{NC}=0.3V, 3.3V V_{COM} = 0.3V,3.3V T_A=-40°C to +85°C			1	μA
$I_{NC(ON)}$ $I_{NO(ON)}$ $I_{COM(ON)}$	Channel ON Leakage Current	V+=3.6V, V_{COM}=0.3V,3.3V V_{NO} or V_{NC}=0.3V,3.3V T_A=-40°C to +85°C			1	μA
V_{INH}	Input High Voltage	V+=1.8V, T_A=-40°C to +85°C	1.5			V
V_{INL}	Input Low Voltage	V+=1.8V, T_A=-40°C to +85°C			0.4	V
I_{IN}	Input Leakage Current	V+=+3.6V, V_{IN}=0V or 3.6V T_A=-40°C to +85°C			1	μA
t_{ON}	Turn-On Time	V_{NO} or V_{NC}=1.5V R_L=300Ω, C_L=35pF Test Circuit 2		40		ns
t_{OFF}	Turn-Off Time	V_{NO} or V_{NC}=1.5V R_L=300Ω, C_L=35pF Test Circuit 2		30		ns

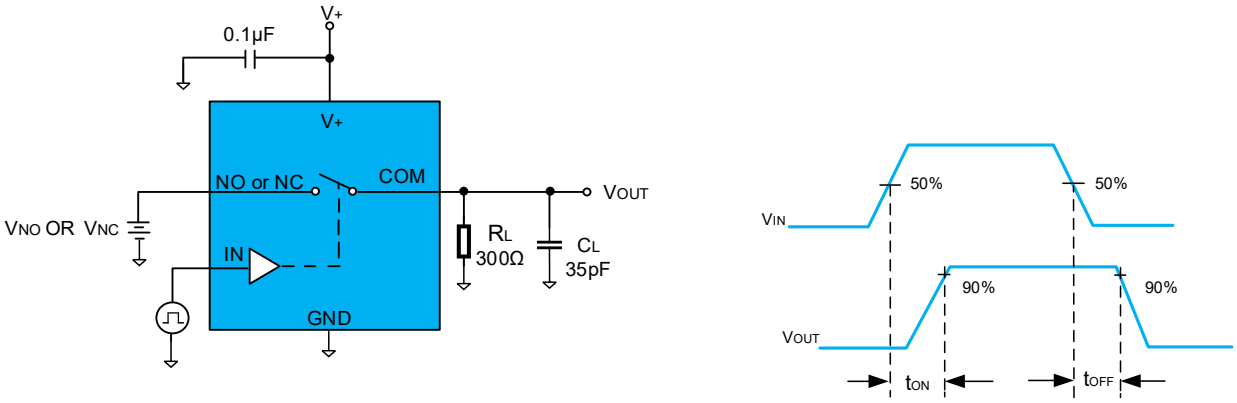
SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP.	MAX	UNIT
t_D	Break-Before-Make Delay Time	V_{NO} or V_{NC}=1.5V R_L=300Ω, C_L=35pF Test Circuit 3		9		ns
t_{PD}	Propagation Delay Time	R_S=39Ω, C_L=50pF, Test Circuit 4		5		ns
O_{ISO}	Off Isolation	R_L=50Ω, C_L=5pF, Signal=0dBm Test Circuit 5, f=10kHz		-50		dB
		R_L=50Ω, C_L=5pF, Signal=0dBm Test Circuit 5, f=1kHz		-70		dB
POWER REQUIREMENTS						
BW	-3dB Bandwidth	Signal=0dBm, R_L=50Ω, C_L=5pF Test Circuit 6		300		MHz
$C_{NC(OFF)}$ $C_{NO(OFF)}$	Source off Capacitance	f=1MHz		5.6		pF
$C_{NC(ON)}$ $C_{NO(ON)}$ $C_{COM(ON)}$	Channel on Capacitance	f=1MHz		15.6		pF
V+	Power Supply Range		1.8		5.5	V
I+	Power Supply Current	V+=+3.6V, V_{IN}=0V or V+ T_A=-40°C to +85°C			1	μA

NOTE1: V_{NC} or V_{NO}=0V,0.3V,0.6V,0.9V,1.2V,1.5V,1.8V,2.1V,2.4V,2.7V.

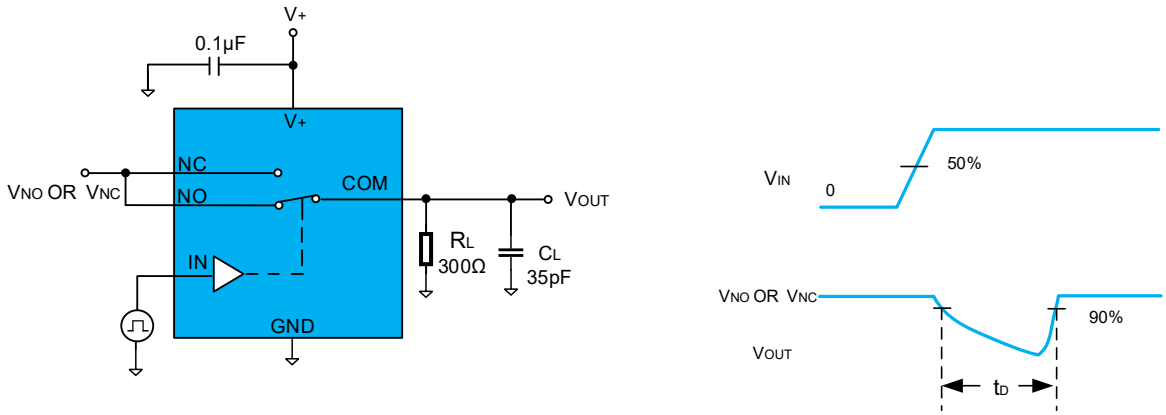
12. Application Notes



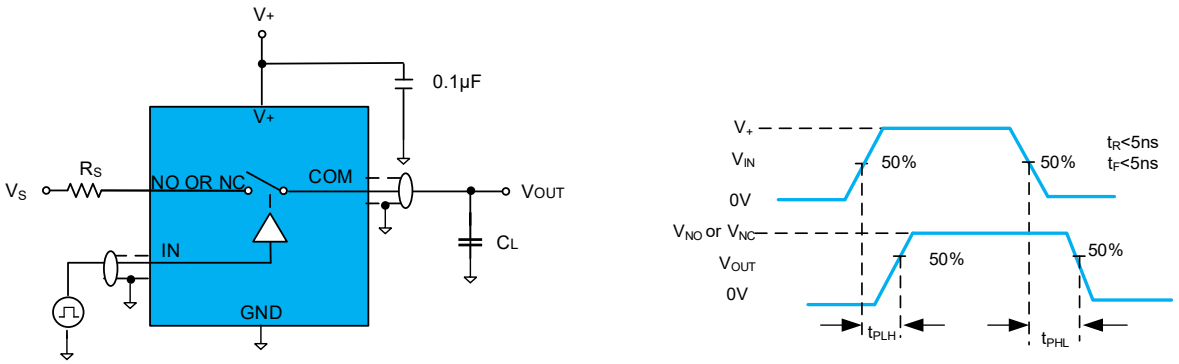
Test circuit 1 On Resistance



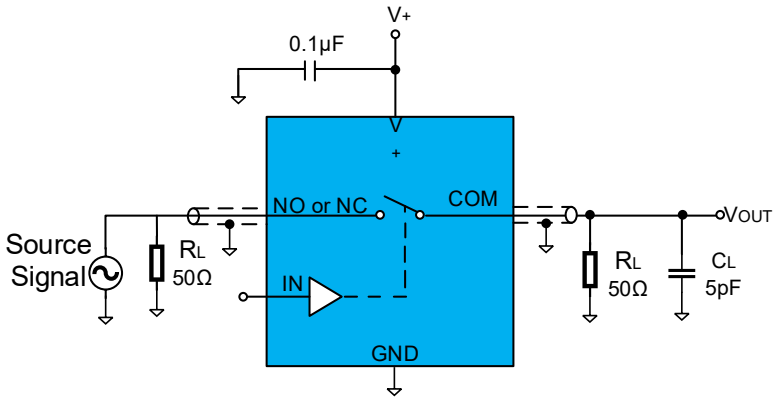
Test Circuit 2 Switching Times



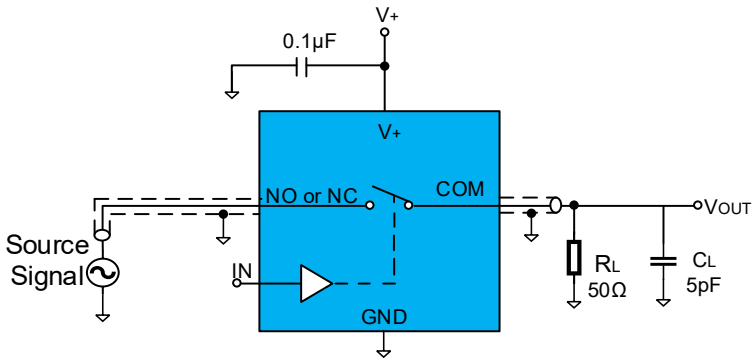
Test circuit 3 Break-Before-Make Delay Time, t_D



Test Circuit 4 Propagation Delay Time, t_{PD}



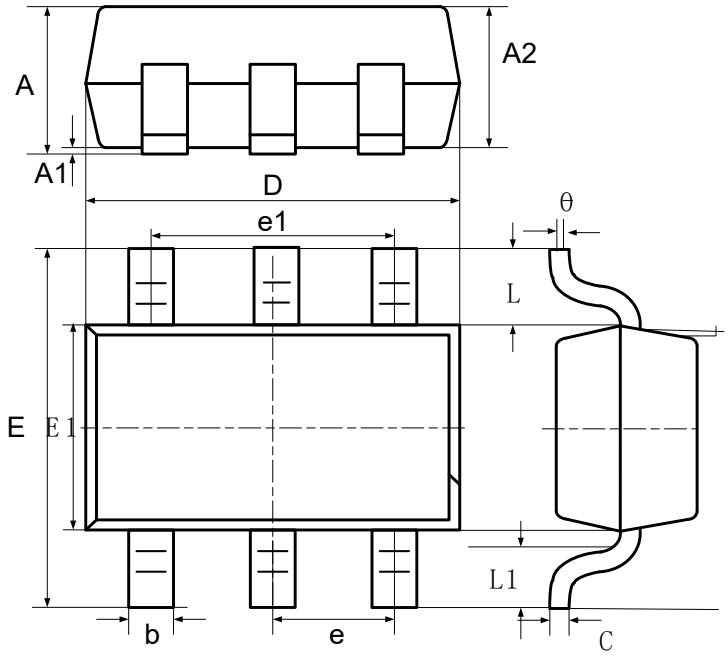
Test Circuit 5 Off Isolation



Test Circuit 6 -3dB Bandwidth

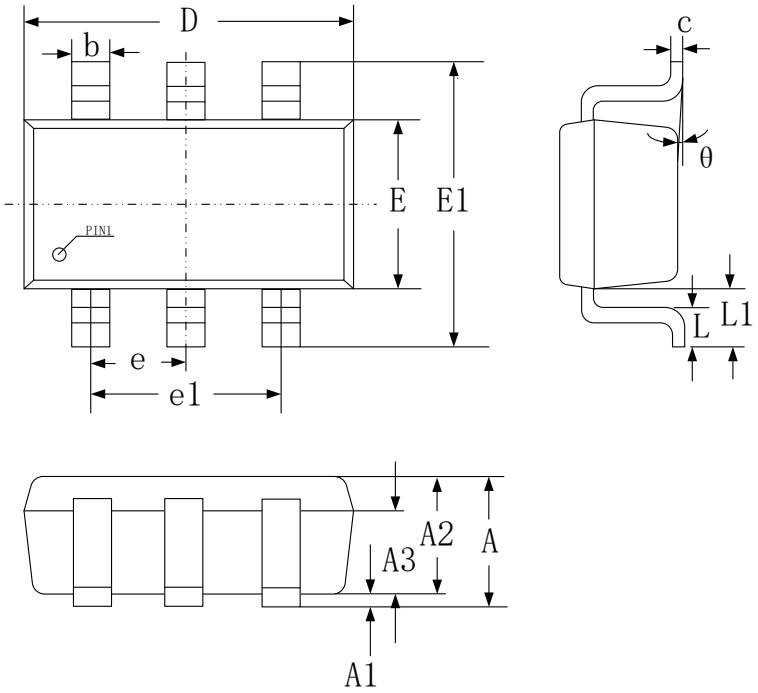
13. Package Information

SOT363



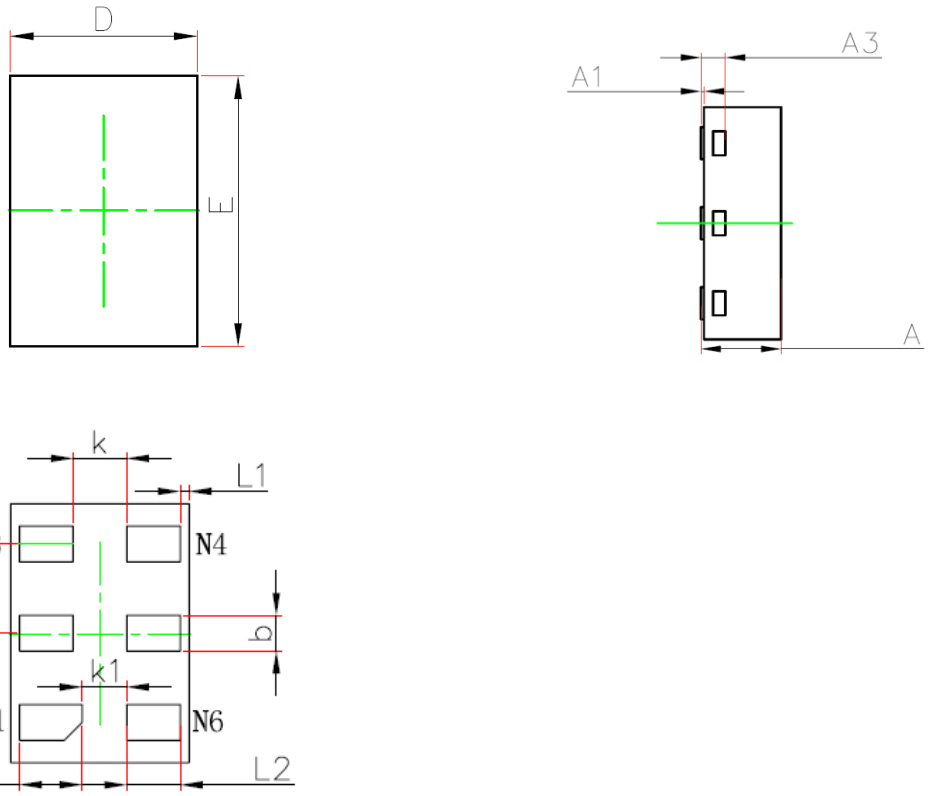
SYMBOL	DIMENSIONS IN MILLIMETERS	
	MIN	MAX
A	0.900	1.100
A1	0.000	0.100
A2	0.900	1.000
b	0.150	0.350
C	0.080	0.150
D	2.000	2.200
E	2.150	2.450
E1	1.150	1.350
e	0.650 typ.	
e1	1.300 BSC	
L	0.525 ref.	
L1	0.260	0.460
θ	0°	8°

SOT23-6



SYMBOL	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	-	-	1.25
A1	0.00	-	0.15
A2	1.00	1.10	1.20
A3	0.575	0.65	0.725
b	0.325	-	0.5
c	0.1	-	0.2
D	2.82	2.92	3.02
E	1.50	1.60	1.70
E1	2.60	2.80	3.00
e	0.925	0.95	0.975
e1	1.90 BSC		
L1	0.59 REF		
L	0.35	0.45	0.60
θ	0°		8°

DFN1*1.45-6



SYMBOL	DIMENSIONS IN MILLIMETERS	
	MIN	NOM
A	0.45	0.55
A1	0.00	0.05
A3	0.152REF	
b	0.15	0.25
D	0.90	1.10
E	1.35	1.55
e	0.50BSC	
K	0.30REF	
K1	0.25REF	
L	0.30	0.40
L1	0.05REF	
L2	0.25	0.35

14. Ordering Information

PART NUMBER	PACKAGE	PACKING QUANTITY
WJ3157-C60R	SOT363	3k/Reel
WJ3157-A60R	SOT23-6	3k/Reel
WJ3157PVR	DFN1*1.45-6	3k/Reel

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Product Specification Statement

1.The product specification aims to provide users with a reference regarding various product parameters, performance, and usage. It presents certain aspects of the product's performance in graphical form and is intended solely for users to select product and make product comparisons, enabling users to better understand and evaluate the characteristics and advantages of the product. It does not constitute any commitment, warranty, or guarantee.

2.The product parameters described in the product specification are numerical values, characteristics, and functions obtained through actual testing or theoretical calculations of the product in an independent or ideal state. Due to the complexity of product applications and variations in test conditions and equipment, there may be slight fluctuations in parameter test values. WAYON shall not guarantee that the actual performance of the product when installed in the customer's system or equipment will be entirely consistent with the product specification, especially concerning dynamic parameters. It is recommended that users consult with professionals for product selection and system design. Users should also thoroughly validate and assess whether the actual parameters and performance when installed in their respective systems or equipment meet their requirements or expectations. Additionally, users should exercise caution in verifying product compatibility issues, and WAYON assumes no responsibility for the application of the product.

3.WAYON strives to provide accurate and up-to-date information to the best of our ability. However, due to technical, human, or other reasons, WAYON cannot guarantee that the information provided in the product specification is entirely accurate and error-free. WAYON shall not be held responsible for any losses or damages resulting from the use or reliance on any information in these product specifications. WAYON reserves the right to revise or update the product specification and the products at any time without prior notice, and the user's continued use of the product specification is considered an acceptance of these revisions and updates. Prior to purchasing and using the product, users should verify the above information with WAYON to ensure that the product specification is the most current, effective, and complete. If users are particularly concerned about product parameters, please consult WAYON in detail or request relevant product test reports. Any data not explicitly mentioned in the product specification shall be subject to separate agreement.

4.Users are advised to pay attention to the parameter limit values specified in the product specification and maintain a certain margin in design or application to ensure that the product does not exceed the parameter limit values defined in the product specification. This precaution should be taken to avoid exceeding one or more of the limit values, which may result in permanent irreversible damage to the product, ultimately affecting the quality and reliability of the system or equipment.

5.The design of the product is intended to meet civilian needs and is not guaranteed for use in harsh environments or precision equipment. It is not recommended for use in systems or equipment such as medical devices, aircraft, nuclear power, and similar systems, where failures in these systems or equipment could reasonably be expected to result in personal injury. WAYON shall assume no responsibility for any consequences resulting from such usage.

6.Users should also comply with relevant laws, regulations, policies, and standards when using the product specification. Users are responsible for the risks and liabilities arising from the use of the product specification and must ensure that it is not used for illegal purposes. Additionally, users should respect the intellectual property rights related to the product specification and refrain from infringing upon any third-party legal rights. WAYON shall assume no responsibility for any disputes or controversies arising from the above-mentioned issues in any form.