Single Non-Inverting Buffer with 3-state Output

General Description

The ET74LV1T126 is a high performance single non-inverting buffer operating from a 1.6V to 5.5V supply. This device is fabricated with advanced CMOS technology to achieve ultra-high speed with high output drive.

Features

- Designed for 1.6V to 5.5V V_{CC} Operation
- Over-voltage Tolerant Inputs
- ±8mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- These Devices are Pb−Free and are RoHS Compliant
- 3−State OE Input is Active−High
- ESD Protection Complies with JESD22 Standard
    - -- HBM: ±4000V Pass (JEDEC JS-001)
    - -- CDM: ±1000V Pass (JEDEC JS-002)
    - Latch-up Performance Exceeds ±100mA per JEDEC JESD78F
- Part No. and Package Information

Part No.	Package	Packing Option	MSL
ET74LV1T126	SC70-5 (1.3mm × 2.1mm)	Tape and Reel, 3K/Reel	Level 1
ET74LV1T126T	SOT23-5 (1.6mm × 2.9mm)	Tape and Reel, 3K/Reel	Level 3
ET74LV1T126Y	DFN6 (1.0mm × 1.5mm)	Tape and Reel, 3K/Reel	Level 1
ET74LV1T126N1	DFN6 (1.0mm × 1.0mm)	Tape and Reel, 10K/Reel	Level 1

Pin Configuration

SOT23-5/SC-70   DFN6(ET74LV1T126Y)   DFN6(ET74LV1T126N1)

TOP VIEW

Figure1. Pin Configuration
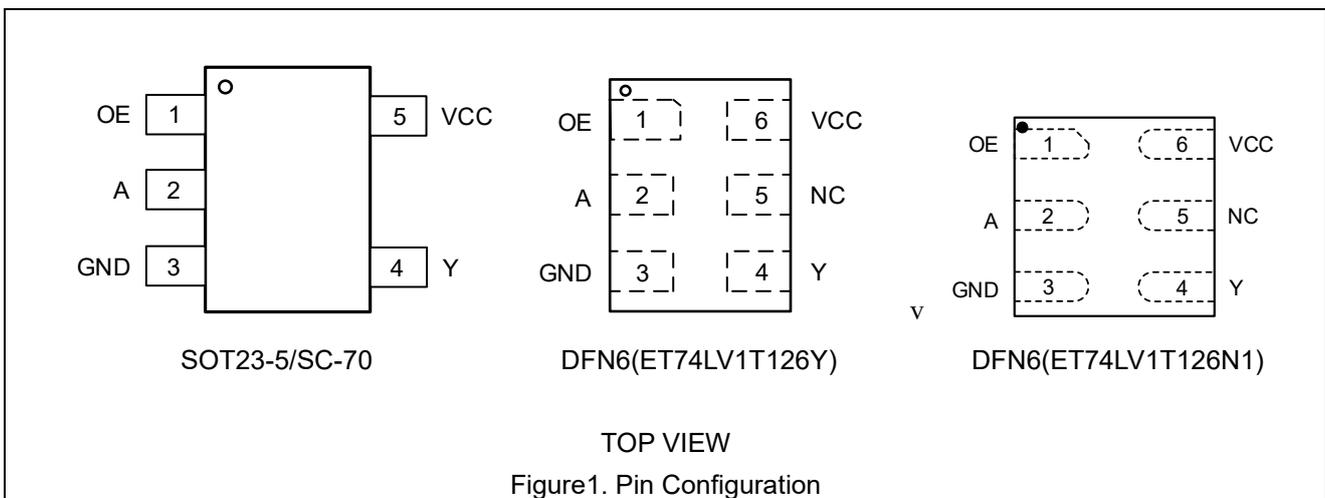
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Pin Function

SC70-5/ SOT23-5

Pin No.	Pin Name	Function
1	OE	Enable Input
2	A	Input
3	GND	Ground
4	Y	Output
5	VCC	Supply Voltage

DFN6

Pin No.	Pin Name	Function
1	OE	Enable Input
2	A	Input
3	GND	Ground
4	Y	Output
5	NC	No Connect
6	VCC	Supply Voltage

Block Diagram

Figure2. Logic Symbol
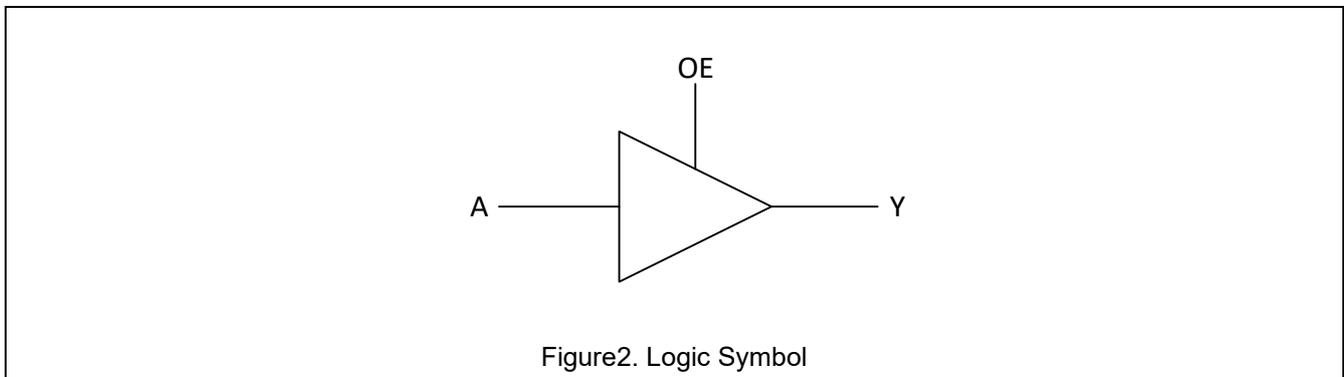
Function Table

Input		Output
OE	A	Y
H	L	L
H	H	H
L	X	Z

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Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply Voltage(VCC Pin)	-0.5 to 7.0	V
V_I	DC Input Voltage [1]	$-0.5 \leq V_I \leq 7.0$	V
V_O	DC Output Voltage Output in Higher or Low State	-0.5 to $V_{CC} + 0.5$	V
I_{IK}	DC Input Diode Current $V_I <$ GND	-50	mA
I_{OK}	DC Output Diode Current $V_O <$ GND, $V_O > V_{CC}$	±50	mA
I_O	DC Output Sink Current	±50	mA
I_{CC}	DC Supply Current Per Supply Pin	100	mA
I_{GND}	DC Ground Current Per Supply Pin	-100	mA
T_{STG}	Storage Temperature Range	-65 to 150	°C
T_L	Lead Temperature, Soldering 10 Seconds	260	°C
T_J	Max Junction Temperature	150	°C
V_{ESD}	ESD Classification	Human Body Model [2]	±4000	V
		Charged Device Model [3]	±1000	
I_{LU}	Max Latch Up Current Above V_{CC} and GND at 125°C [4]	±100	mA

Stresses exceeding those listed in this table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Note1: I_O absolute maximum rating must be observed.

Note2: HBM tested per JEDEC JS-001;

Note3: CDM tested per JEDEC JS-002;

Note4: Latch Up Current Maximum Rating tested per JEDEC JESD78F.

Thermal Characteristics

Symbol	Package	Ratings	Value	Unit
$R_{\theta JA}$	SC70-5	Thermal Characteristics, Thermal Resistance, Junction-to-Air	300	°C/W
	SOT23-5		250	
	DFN6		440	
P_D	SC70-5	Power Dissipation in Still Air at 85°C	215	mW
	SOT23-5		260	
	DFN6		150	

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Recommended Operating Conditions

Symbol	Parameter		Min	Max	Unit
V$_{CC}$	DC Supply Voltage Operating		1.6	5.5	V
V$_{IN}$	DC Input Voltage		0	5.5	V
V$_{OUT}$	DC Output Voltage (High or Low State)		0	5.5	V
T$_A$	Operating Temperature Range		-40	125	°C
t$_r$, t$_f$	Input Rise and Fall Time	V$_{CC}$ = 1.8V to 5.5V	0	20	ns/V

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied.

Electrical Characteristics

DC Electrical Characteristics

Symbol	Parameter	Condition	V$_{CC}$(V)	T$_A$ = 25°C			-40°C≤ T$_A$ ≤125°C		Unit
				Min	Typ	Max	Min	Max	
V$_{IH}$	High−level Input Voltage		1.65~1.8	0.94			1.0		V
			2.0	0.99			1.03		
			2.25~2.5	1.135			1.18		
			2.75	1.21			1.23		
			3.0~3.3	1.35			1.37		
			3.6	1.47			1.48		
			4.5~5.0	2.02			2.03		
			5.5	2.10			2.11		
V$_{IL}$	Low−level Input Voltage		1.65~2.0			0.45		0.40	V
			2.25~2.75			0.75		0.71	
			3.0~3.6			0.80		0.65	
			4.5~5.5			0.80		0.80	
V$_{OH}$	High−level Output Voltage	I$_{OH}$ = -20µA	1.65~5.5	V$_{CC}$ - 0.1	V$_{CC}$		V$_{CC}$ - 0.1		V
		I$_{OH}$ = -2mA	1.65	1.28			1.21		
		I$_{OH}$ = -2mA	1.8	1.5			1.45		
		I$_{OH}$ = -2.3mA	2.3	2.0			2.0		
		I$_{OH}$ = -3mA	2.3	2.0			1.93		
		I$_{OH}$ = -3mA	2.5	2.25			2.15		
		I$_{OH}$ = -3mA	3.0	2.78			2.7		
		I$_{OH}$ = -5.5mA	3.0	2.6			2.49		
		I$_{OH}$ = -5.5mA	3.3	2.9			2.8		
		I$_{OH}$ = -4mA	4.5	4.2			4.1		
		I$_{OH}$ = -8mA	4.5	4.1			3.95		
		I$_{OH}$ = -8mA	5.5	4.6			4.5		
V$_{OL}$	Low−level Output Voltage	I$_{OL}$ = 20µA	1.65~5.5			0.1		0.1	V
		I$_{OL}$ = 2mA	1.65			0.2		0.25	
		I$_{OL}$ = 2.3mA	2.3			0.1		0.15	
		I$_{OL}$ = 3mA	2.3			0.15		0.2	

		I_{OL} = 3mA	3.0			0.1		0.15	
		I_{OL} = 5.5mA	3.0			0.2		0.252	
		I_{OL} = 4mA	4.5			0.15		0.2	
		I_{OL} = 8mA	4.5			0.3		0.35	
I_I	Input Leakage Current	V_{IN} = 5.5V or GND	0 to 5.5			±0.1		±1.0	µA
I_{OZ}	OFF-state output current					±0.25		±2.5	µA
I_{CC}	Quiescent Supply Current	V_{IN} = 5.5 V or GND	5.5			1.0		10	µA
ΔI_{CC}	Additional Supply Current	Per Input Pin; V_I = 0.3V or 1.1V; I_O = 0A; Other Pins at V_{CC} or GND	1.8			10		10	µA
		Per Input Pin; V_I = 0.3V or 3.4V; I_O = 0A; Other Pins at V_{CC} or GND	5.5			1.35		1.5	mA

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

AC Electrical Characteristics

Symbol	Parameter	Condition	V_{CC}(V)	T_A = 25 °C			-40°C ≤ T_A ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation Delay (Figure3 & 4)	C_L = 15pF	1.8		13.3	16.5		18.5	ns
		C_L = 30pF	1.8		14.2	17.7		18.7	
		C_L = 15pF	2.5		8.4	10.4		12	
		C_L = 30pF	2.5		9.1	11.3		13	
		C_L = 15pF	3.3		6.7	8.3		9.4	
		C_L = 30pF	3.3		7.3	8.9		10.2	
		C_L = 15pF	5.0		5.6	6.5		7.3	
		C_L = 30pF	5.0		6	7		7.9	
t_{PZL} t_{PZH}	Output Enable Time (Figure5)	C_L = 15pF	1.8		13.3	16.5		18.5	ns
		C_L = 30pF	1.8		14.2	17.7		20.2	
		C_L = 15pF	2.5		9.9	11.9		13.5	
		C_L = 30pF	2.5		10.7	12.8		14.5	
		C_L= 15pF	3.3		6.8	8.3		9.4	

		C$_L$= 30pF	3.3		7.5	8.9		10.2	
		C$_L$= 15pF	5.0		5.8	6.7		7.6	
		C$_L$= 30pF	5.0		6.2	7.2		8.3	
t$_{PLZ}$ t$_{PHZ}$	Output Disable Time (Figure5)	C$_L$= 15pF	1.8		15.1	18.1		20.1	ns
		C$_L$= 30pF	1.8		18.2	21.1		23.1	
		C$_L$= 15pF	2.5		12	13.5		15.1	
		C$_L$= 30pF	2.5		13.9	15.5		17.1	
		C$_L$= 15pF	3.3		9.9	11.1		12.1	
		C$_L$= 30pF	3.3		11.4	12.6		13.6	
		C$_L$= 15pF	5.0		7.5	8.5		9	
		C$_L$= 30pF	5.0		8.4	9.4		10	

Capacitance Characteristics

Symbol	Parameter	Condition	Typ	Unit
C$_{IN}$	Input Capacitance	V$_{CC}$ = 5.5V, V$_I$ = 0 V or V$_{CC}$	5	pF
C$_{PD}$	Power Dissipation Capacitance [5]	10MHz, V$_{CC}$ = 3.3V, V$_I$ = 0 V or V$_{CC}$	15	pF
		10MHz, V$_{CC}$ = 5.5V, V$_I$ = 0 V or V$_{CC}$	15	

Note5: C$_{PD}$ is used to determine the dynamic power dissipation (P$_D$ in μW).

$$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o) \text{ where:}$$

f$_i$ = input frequency in MHz;

f$_o$ = output frequency in MHz;

C$_L$ = output load capacitance in pF;

V$_{CC}$ = supply voltage in V;

N = number of inputs switching;

$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of outputs.

AC Test Circuit

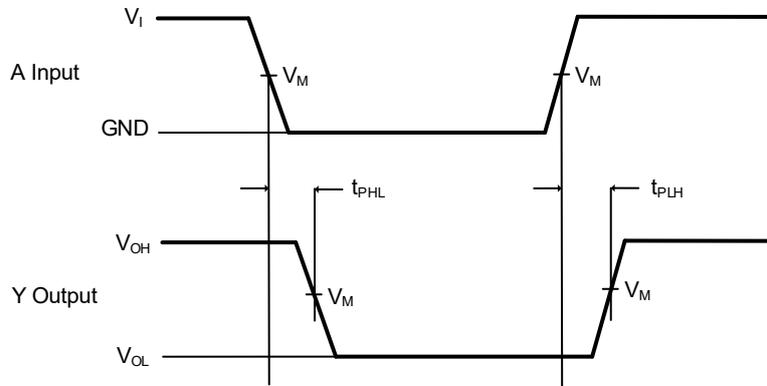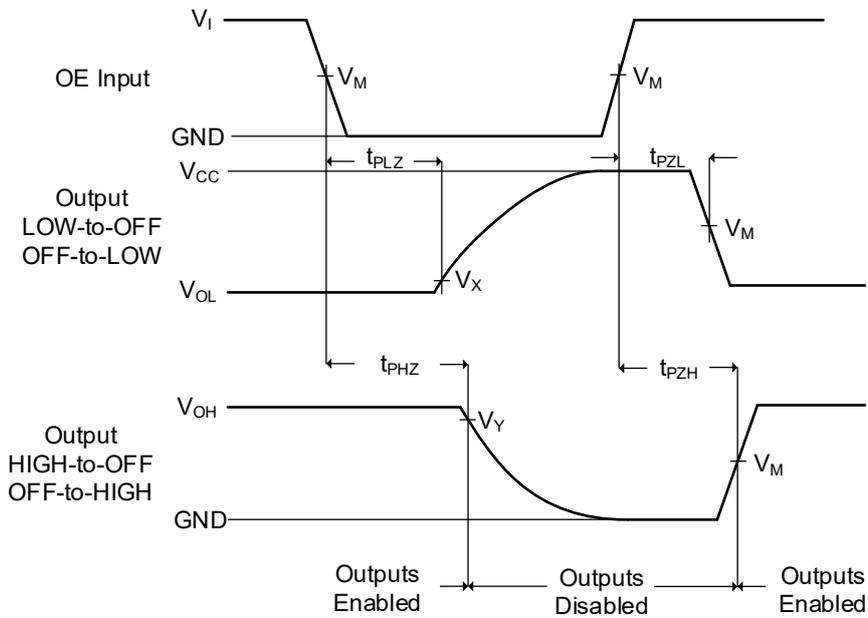

Figure3. Input A to output Y propagation delay times

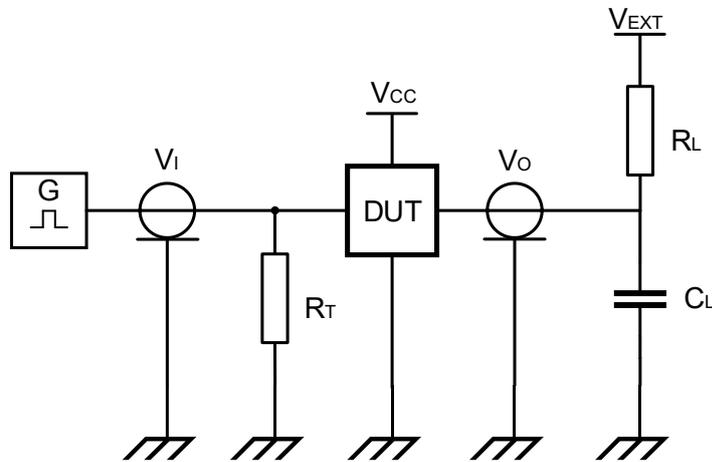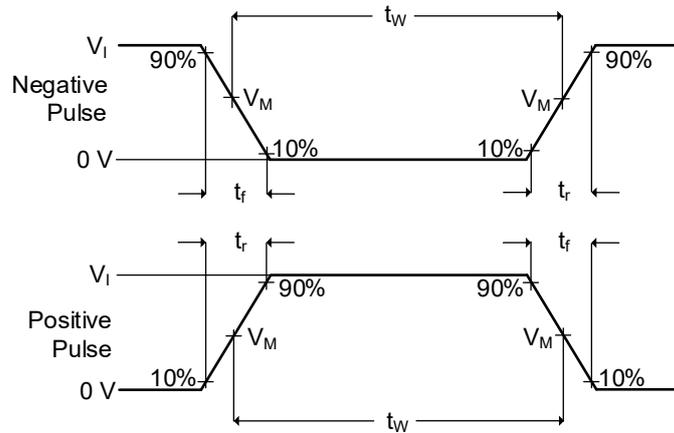Measurement points are given in Table 1.

V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Figure4. 3-state enable and disable times

Table 1. Measurement Points

Input	Output		
V_M	V_M	V_X	V_Y
$0.5 \times V_I$	$0.5 \times V_{CC}$	$V_{OL} + 0.3V$	$V_{OH} - 0.3V$

Measurement points are given in Table 2.

Definitions test circuit:

R_L = Load resistance;

C_L = Load capacitance including jig and probe capacitance;

R_T = Termination resistance should be equal to output impedance Z_O of the pulse generator;

V_{EXT} = External voltage for measuring switching times.

Figure5. Test circuit for measuring switching times

Table 2. Test Data

Supply Voltage	Input			Load		V_{EXT}		
V_{CC}	V_I	$t_r = t_f$	f_{max}	C_L	R_L	t_{PLH}, t_{PHL}	t_{PLH}, t_{PHL}	t_{PLH}, t_{PHL}
1.8V	V_{CC}	≤ 3ns	15MHz	15pF, 30pF	1KΩ	open	GND	V_{CC}
2.5V	V_{CC}	≤ 3ns	25MHz	15pF, 30pF	1KΩ	open	GND	V_{CC}
3.3V	3V	≤ 3ns	50MHz	15pF, 30pF	1KΩ	open	GND	V_{CC}
5.0V	3V	≤ 3ns	50MHz	15pF, 30pF	1KΩ	open	GND	V_{CC}

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Package Dimension

SC70-5(1.3mm × 2.1mm)
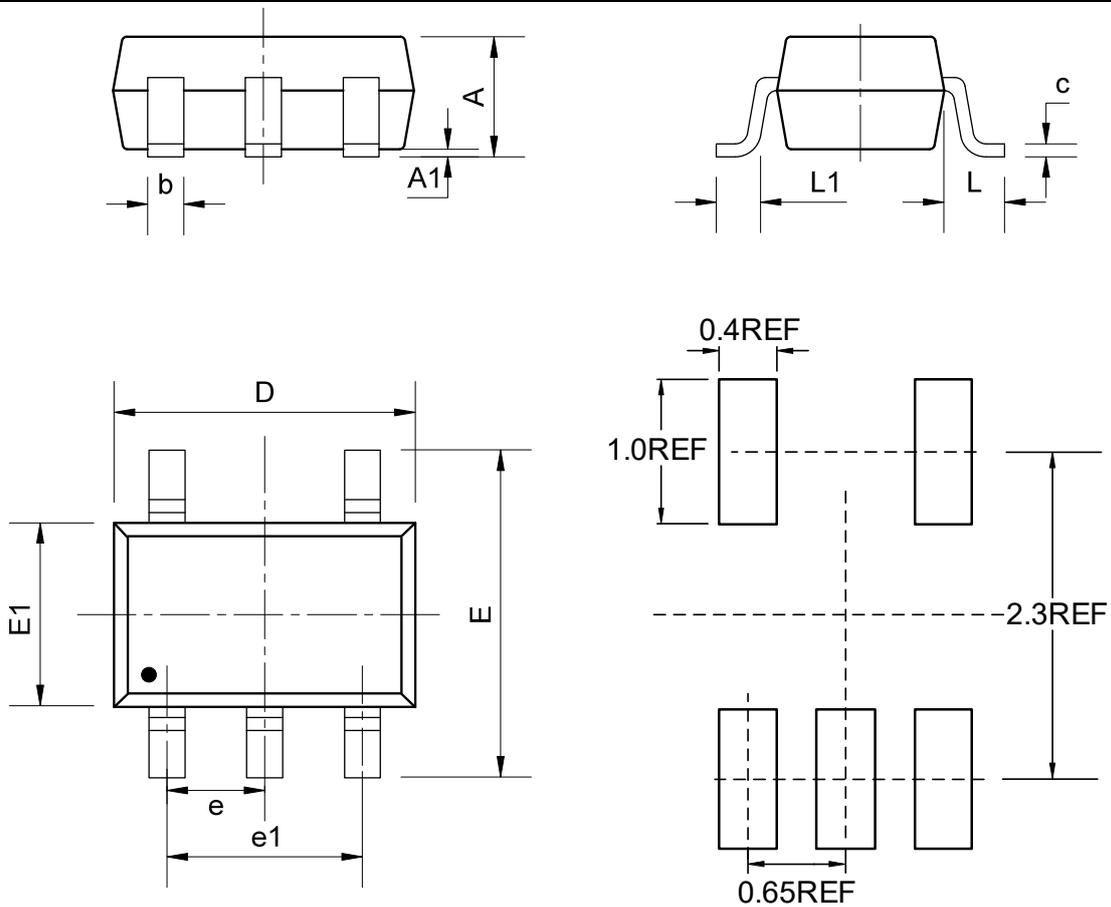
COMMON DIMENSIONS

(Unit: mm)

SYMBOL	MIN	NOM	MAX
A	-	-	1.10
A1	0.00	-	0.15
b	0.15	-	0.35
c	0.08	-	0.20
D	2.00	2.10	2.30
e	0.65BSC		
e1	1.30BSC		
E	2.15	2.30	2.50
E1	1.15	1.30	1.45
L	0.50REF		
L1	0.33REF		

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SOT23-5(1.6mm × 2.9mm)
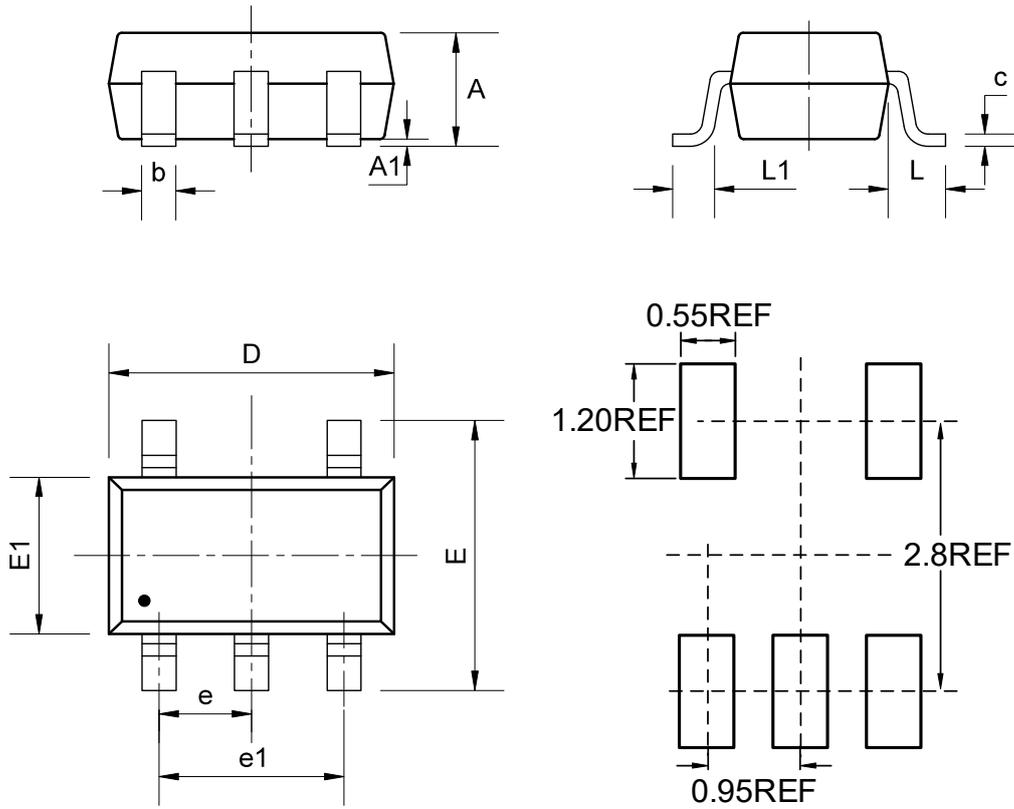
COMMON DIMENSIONS

(Unit: mm)

SYMBOL	MIN	NOM	MAX
A	-	-	1.25
A1	0.00	-	0.15
b	0.36	-	0.50
c	0.12	-	0.20
D	2.75	2.9	3.05
e	0.90	0.95	1.00
e1	1.80	1.90	2.00
E	2.60	2.80	3.00
E1	1.45	1.6	1.75
L	0.60REF		
L1	0.30	0.45	0.60

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DFN6 (1.0mm × 1.5mm)

1.7REF

1.0REF

0.2REF

0.25REF

0.5REF

0.3REF
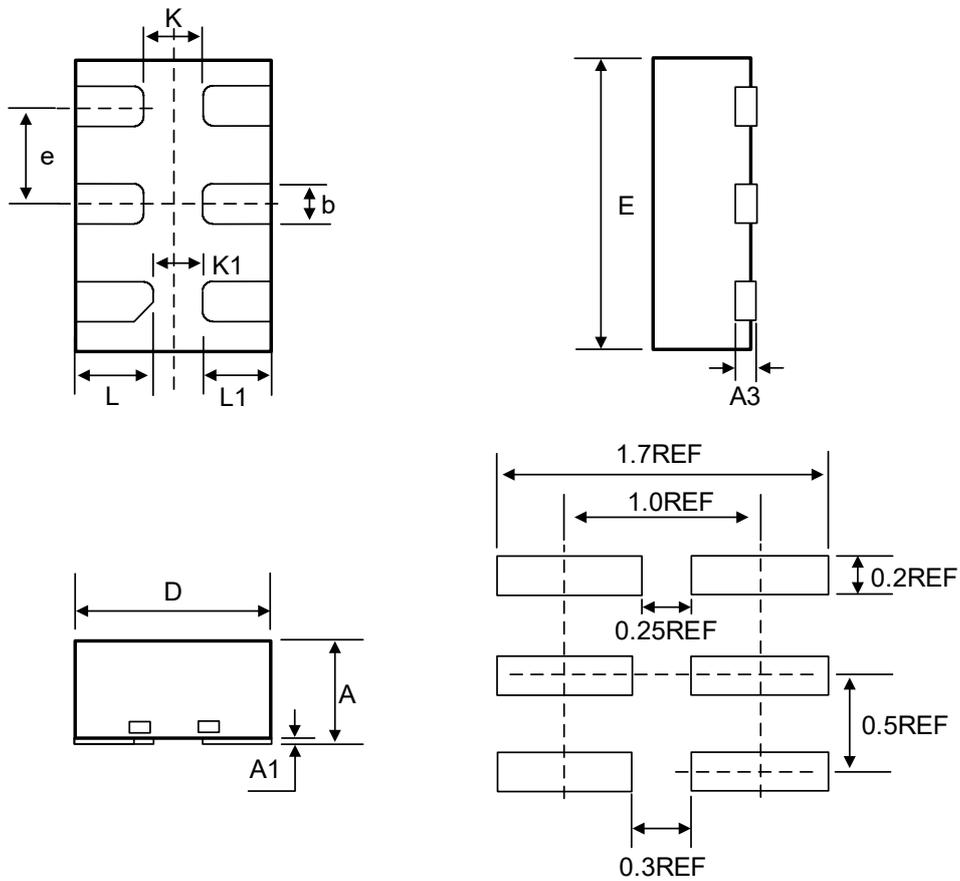
COMMON DIMENSIONS

(Unit: mm)

SYMBOL	MIN	NOM	MAX
A	0.50	--	0.60
A1	0.00	0.02	0.05
A3	0.10REF		
b	0.15	0.20	0.25
D	0.90	1.00	1.10
E	1.40	1.50	1.60
e	0.50BSC		
K	0.30REF		
K1	0.25REF		
L	0.35	0.40	0.45
L1	0.30	0.35	0.40

ET74LV1T126

DFN6(1.0mm × 1.0mm)
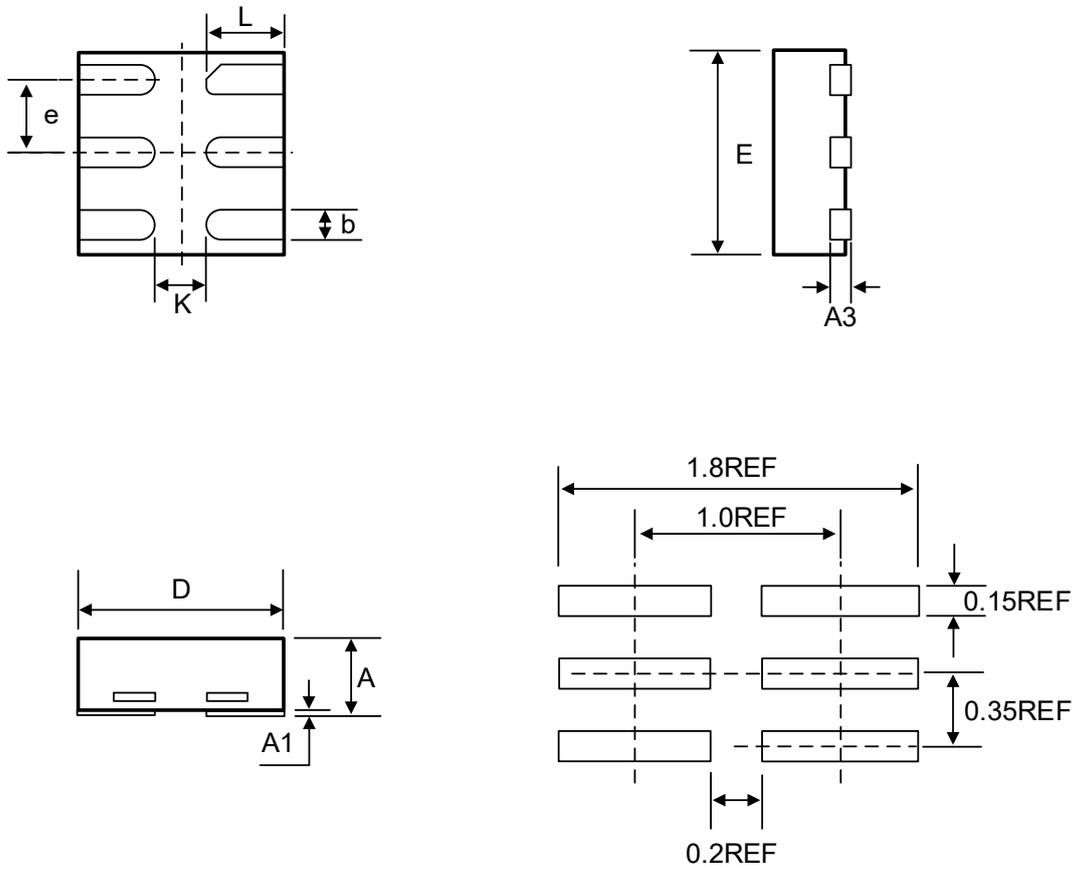
COMMON DIMENSIONS

(Unit: mm)

SYMBOL	MIN	NOM	MAX
A	0.50	0.55	0.60
A1	0.00	-	0.05
A3	0.15REF		
b	0.10	0.15	0.20
D	0.95	1.00	1.05
E	0.95	1.00	1.05
e	0.35BSC		
K	0.20REF		
L	0.30	0.40	0.50

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2025-11-03	Official Version	Wang anran	Yang xiaoxu	Liu jiaying