Single 3-Input Positive OR-AND Gate

General Description

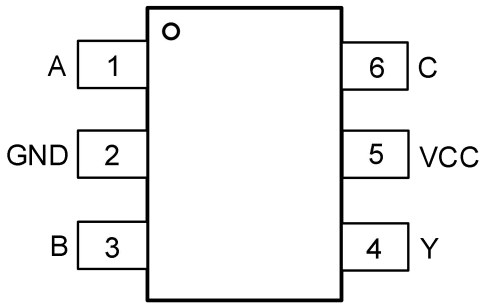
The ET74LVC1G3208 is a single 3-input positive OR-AND gate operating from a 1.65V to 5.5V supply. This device is fabricated with advanced CMOS technology to achieve ultra-high speed with high output drive.

Features

- Designed for 1.65V to 5.5V V_{CC} Operation
- Over-voltage Tolerant Inputs Accept Voltages to 5.5V
- ±32mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- These Devices are Pb-Free and RoHS Compliant
- 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
ET74LVC1G3208	SC70-6 (1.3mm × 2.1mm)	Tape and Reel, 3K/Reel	1
ET74LVC1G3208T	SOT23-6 (1.6mm × 2.9mm)	Tape and Reel, 3K/Reel	3

Pin Configuration



SC70-6/SOT23-6

Figure1. Pin Configuration

Pin Function

SC70-6/SOT23-6

Pin No.	Pin Name	Function
1	A	Input A
2	GND	Ground
3	B	Input B
4	Y	Output Y
5	VCC	Supply Voltage
6	C	Input C

Block Diagram

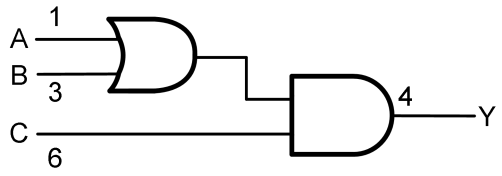


Figure2. Logic Symbol

Functional Description

Input			Output
A	**B**	**C**	**Y**
H	X	H	H
X	H	H	H
X	X	L	L
L	L	H	L

H = HIGH voltage level;

L = LOW voltage level;

X = Don’t care.

Function Selection Table

Logic function	Figure
2-input AND Gate	See Figure3
2-input OR Gate	See Figure4
Y= (A + B) • C	See Figure5

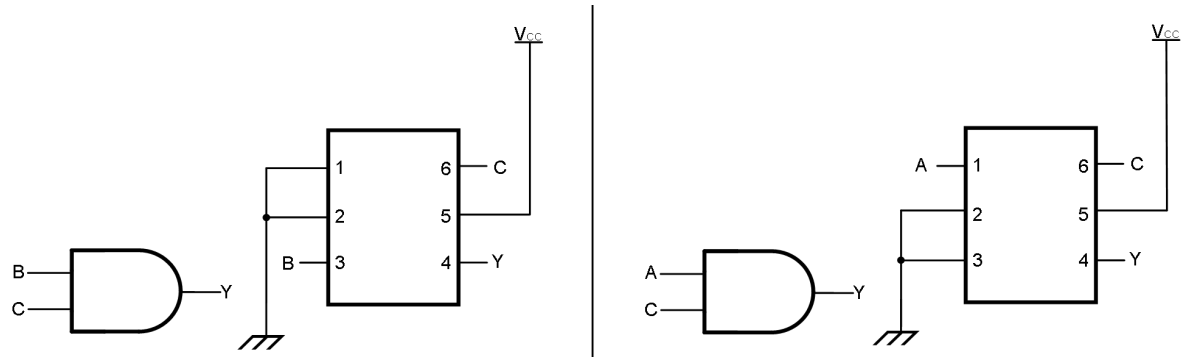


Figure3. 2-input AND gate

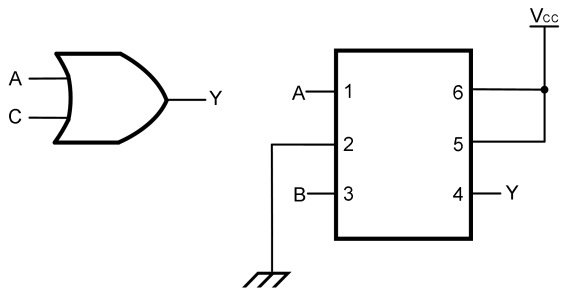


Figure4. 2-input OR gate

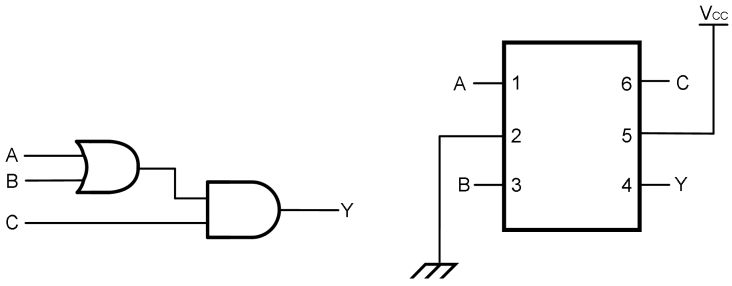


Figure5. Y= (A • B) + C

Absolute Maximum Ratings

Symbol	Parameter		Value	Unit
V_{CC}	DC Supply Voltage		-0.5 to 6.5	V
V_I	DC Input Voltage (1)		-0.5 ≤ V_I ≤ 6.5	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		250	°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 the Maximum Ratings 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
$R_{\theta JA}$	SC70-6	Thermal Characteristics, Thermal Resistance, Junction-to-air	280	°C/W
	SOT23-6		180	
P_D	SC70-6	Power Dissipation in Still Air at 25°C	230	mW
	SOT23-6		360	

Recommended Operating Conditions

Symbol	Parameter		Min	Max	Unit
V_{CC}	DC Supply Voltage Operating		1.65	5.5	V
	Date Retention		1.5	5.5	
V_I	DC Input Voltage		0	V_{CC}	V
V_O	DC Output Voltage (High or Low State)		0	V_{CC}	V
T_A	Operating Temperature Range		-40	125	°C
t_r, t_f	Input Rise and Fall Time	V_{CC} = 1.8V ± 0.15V, 2.5V ± 0.2V	0	20	ns/V
		V_{CC} = 3.0V ± 0.3V	0	10	
		V_{CC} = 5.0V ± 0.5V	0	5	

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		1.65~1.95	0.65V_{CC}			0.65V_{CC}		V
			2.3~2.7	1.7			1.7		
			3.0~3.6	2.0			2.0		
			4.5~5.5	0.7V_{CC}			0.7V_{CC}		
V_{IL}	Low-Level Input Voltage		1.65~1.95			0.35V_{CC}		0.35V_{CC}	V
			2.3~2.7			0.7		0.7	
			3.0~3.6			0.8		0.8	
			4.5~5.5			0.3V_{CC}		0.3V_{CC}	
V_{OH}	High-Level Output Voltage	I_{OH} = -100uA	1.65~5.5	V_{CC} - 0.1			V_{CC} - 0.1		V
		I_{OH} = -4mA	1.65	1.2			0.95		
		I_{OH} = -8mA	2.3	1.9			1.7		
		I_{OH} = -12mA	2.7	2.2			1.9		
		I_{OH} = -24mA	3.0	2.3			2.3		
		I_{OH} = -32mA	4.5	3.8			3.4		
V_{OL}	Low-Level Output Voltage	I_{OL} = 100uA	1.65~5.5			0.1		0.1	V
		I_{OL} = 4mA	1.65			0.45		0.70	
		I_{OL} = 8mA	2.3			0.3		0.45	
		I_{OL} = 12mA	2.7			0.4		0.60	
		I_{OL} = 24mA	3.0			0.55		0.80	
		I_{OL} = 32mA	4.5			0.55		0.80	
I_I	Input Leakage Current	V_I = 5.5V or GND	0~5.5			±5		±5	uA
I_{OFF}	Power Off Leakage Current	V_I = 5.5V or V_O = 5.5V	0			±10		±10	uA
I_{CC}	Quiescent Supply Current	V_I = 5.5V or GND	1.65~5.5			10		10	uA
ΔI_{CC}	Additional Supply Current	Per Pin:V_I = V_{CC} - 0.6V; I_O = 0mA	3~5.5			500		500	uA

AC Electrical Characteristics

$t_r = t_f = 3ns$

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 and 4)	R_L = 1MΩ, C_L = 15pF	1.65~1.95	3.7	7.6	14.9	3.7	21.5	ns
			2.3~2.7	2.5	4.2	8.1	2.4	11.4	
			3.0~3.6	1.7	3.1	5.9	1.6	8.2	
			4.5~5.5	1.3	2.4	4.4	1.2	5.9	
		R_L = 1kΩ, C_L = 30pF	1.65~1.95	2.5	8.0	15.5	2.5	22.3	
		R_L = 500Ω, C_L = 30pF	2.3~2.7	1.8	4.4	8.4	1.8	12.2	
		R_L = 500Ω, C_L = 50pF	3.0~3.6	1.8	3.6	7.0	1.8	9.5	
			4.5~5.5	1.3	2.8	5.3	1.3	7.1	

Capacitance Characteristics

Symbol	Parameter	Condition	Typ	Unit
C_{IN}	Input Capacitance	V_{CC} = 3.3V, V_I = 0V or V_{CC}	3.2	pF
C_{PD}	Power Dissipation Capacitance (5)	10MHz, V_{CC} = 3.3V, V_I = 0V or V_{CC}	17	pF

Note5: C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

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

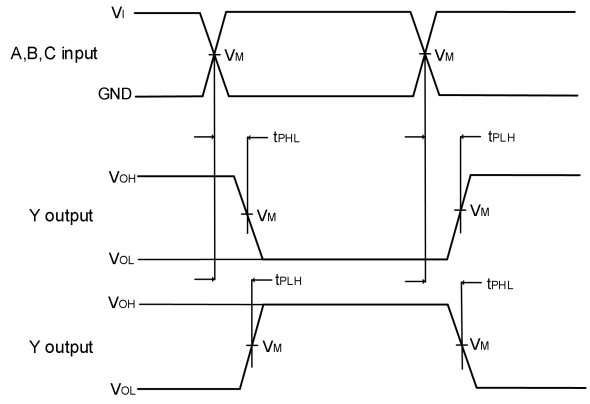


Figure3. Switching Waveform

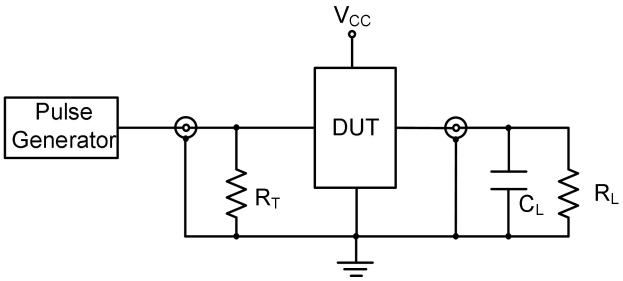


Figure4. Test Circuit

AC Measurement Points

Supply Voltage	Input		Output
V_{CC}	V_M	V_I	V_M
1.65V to 1.95V	0.5 × V_{CC}	V_{CC}	0.5 × V_{CC}
2.3V to 2.7V	0.5 × V_{CC}	V_{CC}	0.5 × V_{CC}
3.0V to 3.6V	1.5V	3.0V	1.5V
4.5V to 5.5V	0.5 × V_{CC}	V_{CC}	0.5 × V_{CC}

AC Test Data1

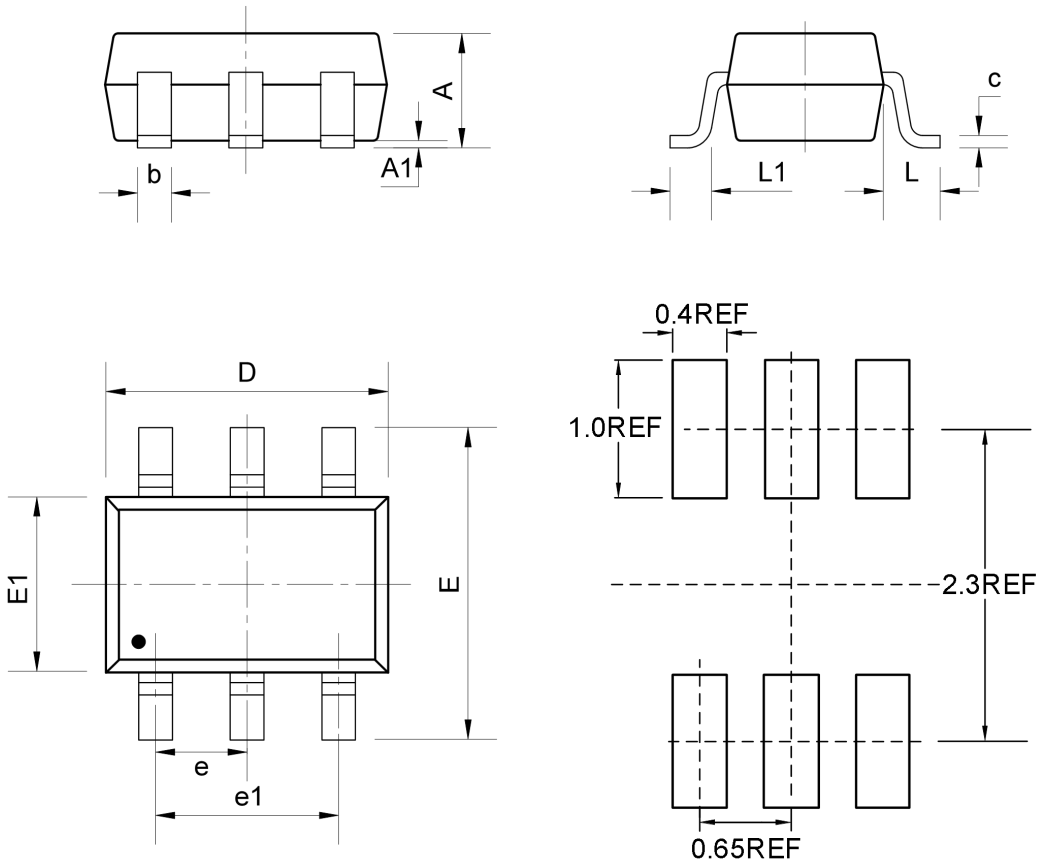
Supply Voltage	Input		Load	
V_{CC}	V_I	$t_r = t_f$	C_L	R_L
1.65V to 1.95V	V_{CC}	3.0ns	15pF	1MΩ
2.3V to 2.7V	V_{CC}	3.0ns	15pF	1MΩ
3.0V to 3.6V	3.0V	3.0ns	15pF	1MΩ
4.5V to 5.5V	V_{CC}	3.0ns	15pF	1MΩ

AC Test Data2

Supply Voltage	Input		Load	
V_{CC}	V_I	$t_r = t_f$	C_L	R_L
1.65V to 1.95V	V_{CC}	3.0ns	30pF	1kΩ
2.3V to 2.7V	V_{CC}	3.0ns	30pF	500Ω
3.0V to 3.6V	3.0V	3.0ns	50pF	500Ω
4.5V to 5.5V	V_{CC}	3.0ns	50pF	500Ω

Package Dimension

SC70-6 (1.3mm × 2.1mm)

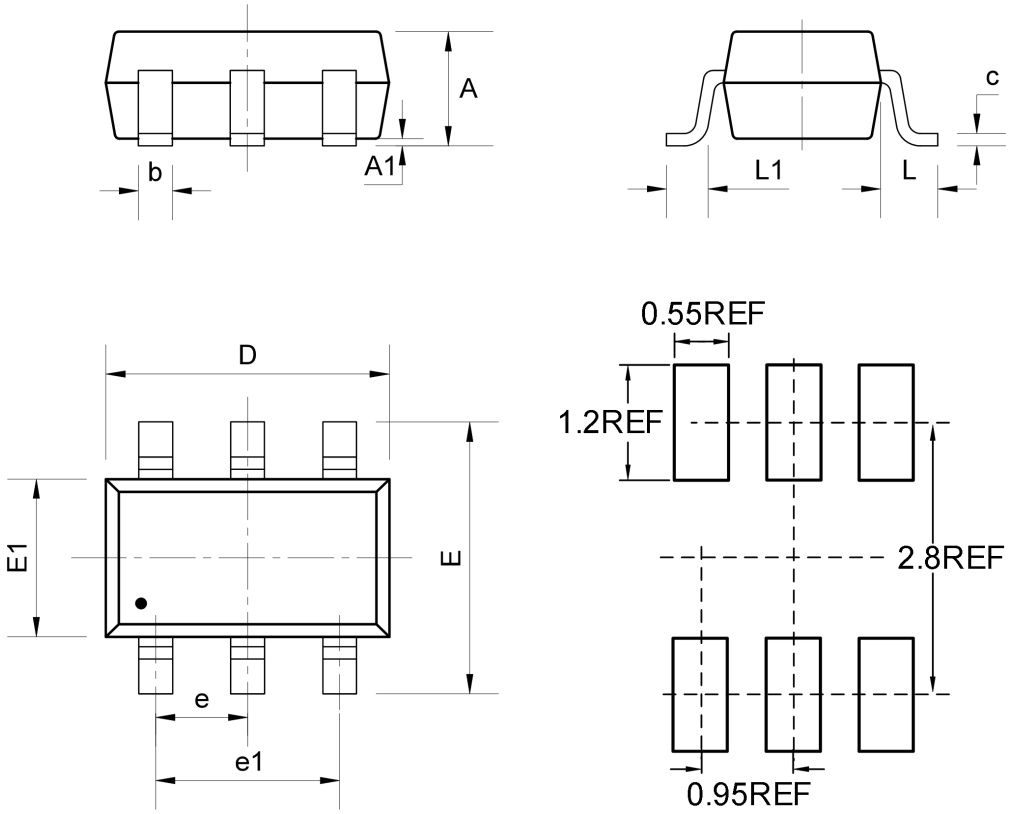


COMMON DIMENSIONS

(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		

SOT23-6 (1.6mm × 2.9mm)



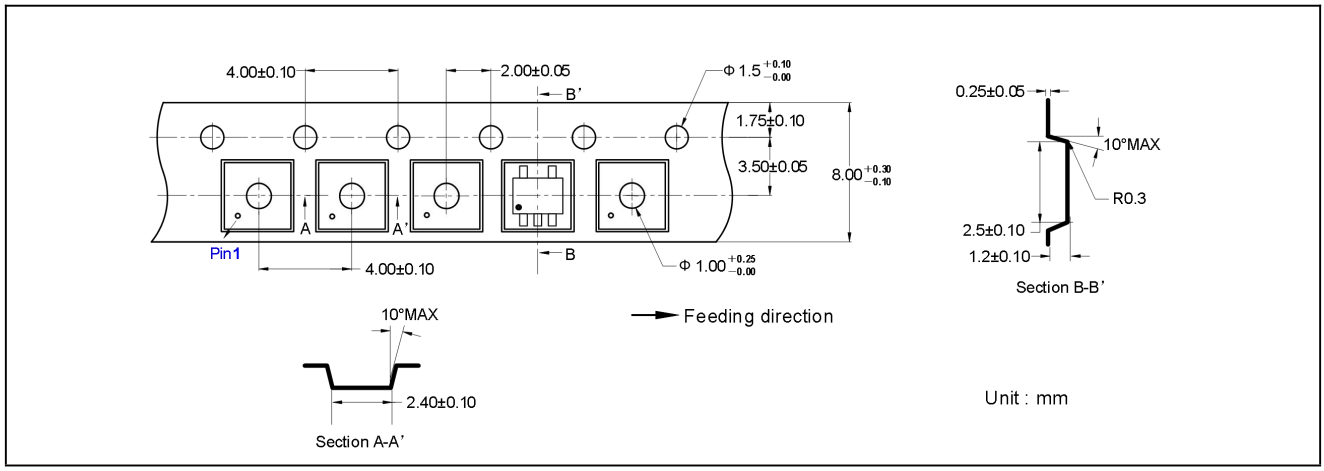
COMMON DIMENSIONS

(Unit: mm)

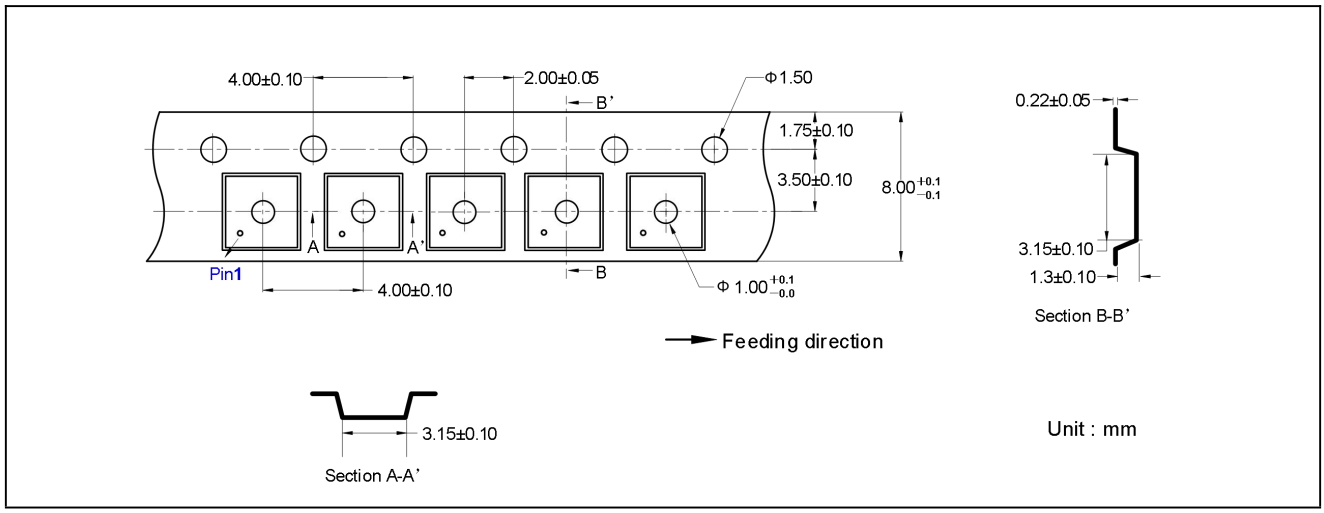
SYMBOL	MIN	NOM	MAX
A	-	-	1.45
A1	0.00	-	0.15
b	0.28	0.35	0.50
c	0.08	0.15	0.22
D	2.75	2.9	3.05
e	0.90	0.95	1.00
e1	1.80	1.90	2.00
E	2.60	2.80	3.00
E1	1.45	1.6	1.75
L	0.60REF		
L1	0.30	0.45	0.60

Tape Information

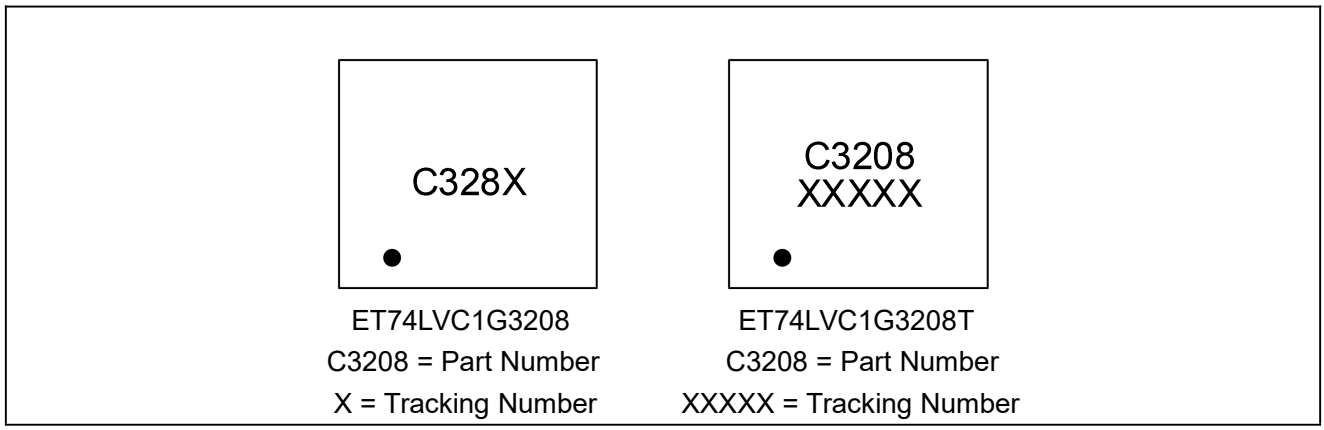
SC70-6 (1.3mm × 2.1mm)



SOT23-6 (1.6mm × 2.9mm)



Marking Information



ET74LVC1G3208
C3208 = Part Number
X = Tracking Number

ET74LVC1G3208T
C3208 = Part Number
XXXXX = Tracking Number

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2025-11-21	Official Version	Xu tao	Yang xiaoxu	Liu Jiaying
1.1	2026-04-27	Update Thermal Characteristics and Format	Xu tao	Yang xiaoxu	Liu Jiaying