

## High-precision Three-wire Switch Microphone Chip

### General Description

The ET601/ET603 series products are high-performance three-wire switch chips used for electronic vaping devices.

The ET601 supports the AnyPa™ sensitivity setting function, which enables high-precision setting requirements for the production line in terms of air pressure sensitivity. The ET603 is a traditional preset sensitivity product with a built-in unified air pressure sensitivity threshold. It offers the option of positive suction or reverse suction trigger directions to accommodate different structural sensors. The ET601BHB/ET603BHB are positive suction trigger products, while the ET601RHB/ET603RHB are reverse suction trigger products. The ET601xHB/ET603xHB are high-level mode products that output a high level when triggering smoking. The ET601xFB/ET603xFB are frequency mode products that support two-level suction force determination, using two different frequency square waves to distinguish between light and heavy inhalation.

This product is available in two packaging options: the standard SOT23-5 type, and a smaller and thinner MSOT-4 type.

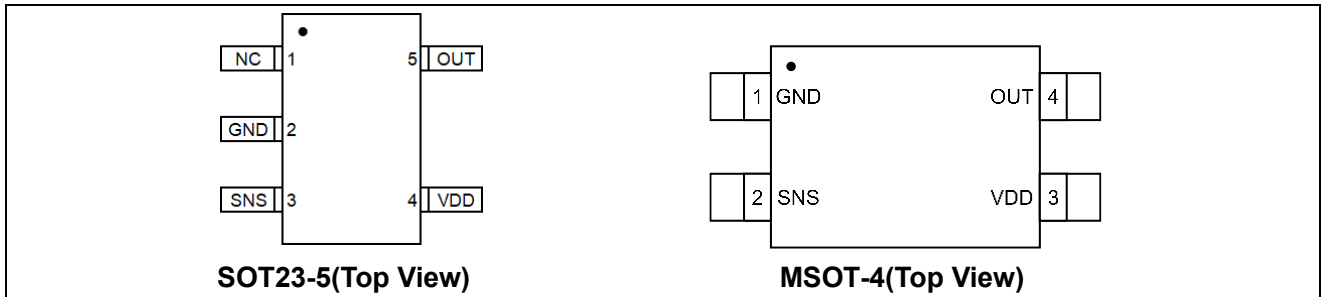
### Features

- High-sensitivity Microphone Detection
- There are two trigger modes for smoking available: positive suction and reverse suction
- Optional different output modes
  - High-level Output
  - Frequency Output (supports two-level suction force determination)
- The standby current is less than 5  $\mu$ A
- High-Grade ESD protection:
  - Human Body Model: 2kV
  - Charged Device Model: 1kV
- Package Information:

Part No.	Trigger Polarity	Negative pressure sensitivity	Output Mode	Package
ET601BHB	Positive Trigger	Settable	High-level Output	SOT23-5
ET601RHB	Reverse Trigger	Settable	High-level Output	SOT23-5
ET601BHT	Positive Trigger	Settable	High-level Output	MSOT-4
ET601RHT	Reverse Trigger	Settable	High-level Output	MSOT-4
ET601BFB	Positive Trigger	Settable	Frequency Output	SOT23-5
ET603BHB	Positive Trigger	Fixed 1/32	High-level Output	SOT23-5
ET603BFB	Positive Trigger	Fixed 1/32	Frequency Output	SOT23-5

# ET601/ET603

## Pin Configuration

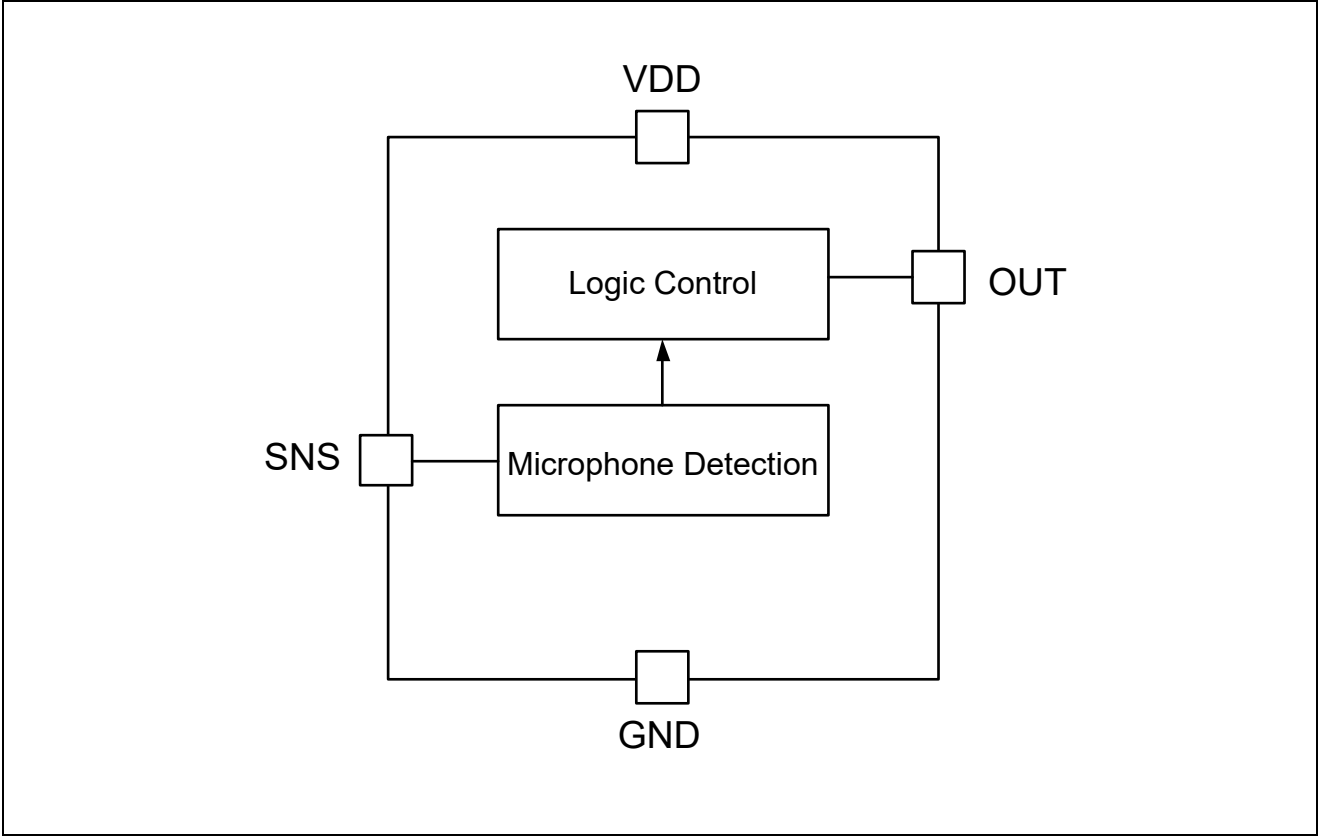


## Pin Function

Pin No.	Name	Description
SOT23-5		
1	NC	Not Connected
2	GND	Ground, connect to the negative terminal of the battery
3	SNS	Sensor detection pin, detecting changes in the capacitance parameters
4	VDD	Power supply, connect to the positive terminal of the battery
5	OUT	Output, connect the IO of the microcontroller
MSOT-4		
1	GND	Ground, connect to the negative terminal of the battery
2	SNS	Sensor detection pin, detecting changes in the capacitance parameters
3	VDD	Power supply, connect to the positive terminal of the battery
4	OUT	Output, connect the IO of the microcontroller

# ET601/ET603

## Block Diagram



# ET601/ET603

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## Functional Description

The ET601/ET603 series products are three-wire switch chips specifically designed for capacitive sensors in electronic vaping devices. This chip integrates a highly sensitive and low-power capacitive detection circuit (with a typical static current of less than 3  $\mu$  A in standby mode).

The ET601/ET603 series products have two modes: high output and frequency output. ET601/3BHB/T is the high output mode. When the device is in standby mode, the OUT pin is at a low level. When the air pressure changes and reaches the preset threshold, a high-level signal is output. ET601/3BFB/T is the frequency output mode. When the device is in standby mode, the OUT pin is at a low level. When the air pressure changes and reaches the preset threshold, a square wave signal is output. It supports two-level suction force determination. It has a built-in dynamic adjustment function, which automatically compensates for the capacitance value drift caused by environmental changes, thereby enhancing the sensor's sensitivity and long-term stability, and reducing the risk of false startup.

## Microphone Detection

This series of chips come with a microphone detection circuit. When the system is in standby mode, the chip continuously monitors the sensor status. An internal smoking detection circuit is included. When the sensor status changes in response to changes in air pressure, the preset smoking detection program is triggered. If the smoking conditions are met, it is determined that a smoking action has occurred. Due to environmental changes, the capacitance of the sensor in the standby mode may change even without smoking. The chip has an internal sensor baseline self-adjustment function. When the capacitance change is not caused by smoking, the baseline capacitance is automatically adjusted to adapt to the smoking sensitivity not being affected by environmental changes.

The ET601 supports the AnyPa™ negative pressure sensitivity setting function, allowing the trigger sensitivity to be freely set in the production line testing equipment. The ET603 supports the traditional fixed sensitivity trigger, with the trigger threshold being 3.125% of the baseline capacitance value.

## Two-level suction force determination

ET601/3BFB/T supports two levels of suction force determination. When the pressure change reaches the preset threshold but does not exceed 4 times the threshold, the output frequency is 3.125 kHz (typical value). When the pressure change exceeds 4 times the threshold, the output frequency is 6.25 kHz (typical value). The low-level pulse width of the square wave signal is a fixed 20  $\mu$ s. The frequency of the square wave signal varies to distinguish between light suction and heavy suction actions. Figure 1 shows the reference waveform for the two levels of suction force determination.

## ET601/ET603

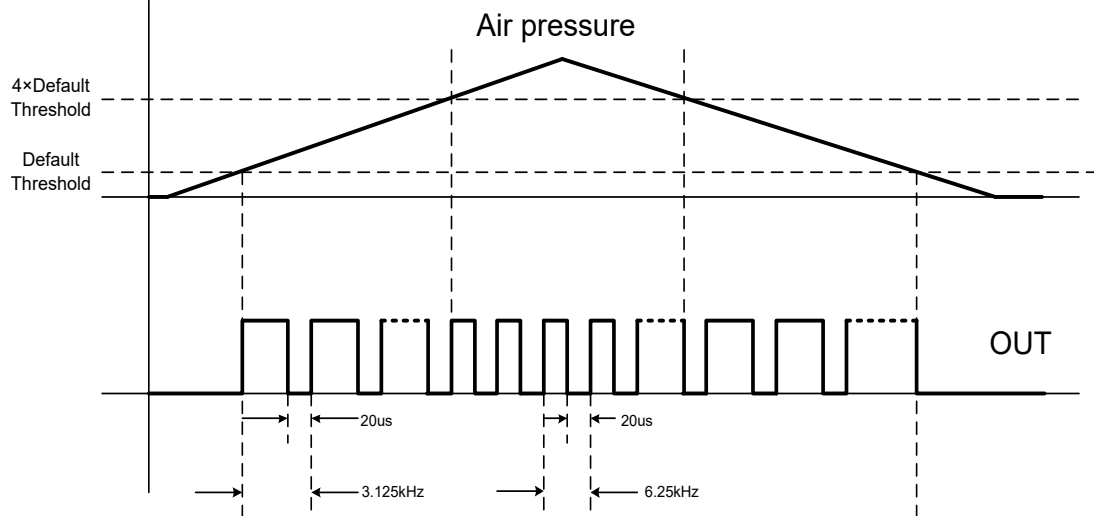


Figure 1. Negative Pressure Variation and OUT Pin Output Waveform

### Over-absorption timeout protection

The ET601/ET603 series products are equipped with an over-voltage protection circuit. If the single smoking duration exceeds 15 seconds, it is regarded as an abnormal situation and the output signal will be stopped.

# ET601/ET603

## Absolute Maximum Ratings

Symbol	Parameters	Min	Max	Unit
V <sub>PIN</sub>	Port Voltage	GND-0.3	GND+6.5	V
T <sub>STG</sub>	Storage Temperature Range	-55	150	°C
ESD	HBM Model		2000	V
	CDM Model		1000	V

**Note.** Exceeding the rated maximum value may cause irreversible damage to the chip's internal components. Working continuously under conditions close to this limit may lead to a decrease in the chip's reliability.

## Recommended Operating Conditions

Symbol	Parameters	Min	Max	Unit
V <sub>DD</sub>	Input Voltage	2.8	4.4	V
C <sub>SNS</sub>	Microphone Capacitor	0.5	5	pF
C <sub>VDD</sub>	Input Decoupling Capacitor	100	1000	nF
T <sub>A</sub>	Operating Temperature Range	-40	+85	°C

# ET601/ET603

## Electrical Characteristics

$V_{DD} = 2.8V$  to  $4.4V$ ,  $C_{VDD} = 0.1\mu F$ , typical values are at  $T_A = +25^\circ C$ , unless otherwise noted.

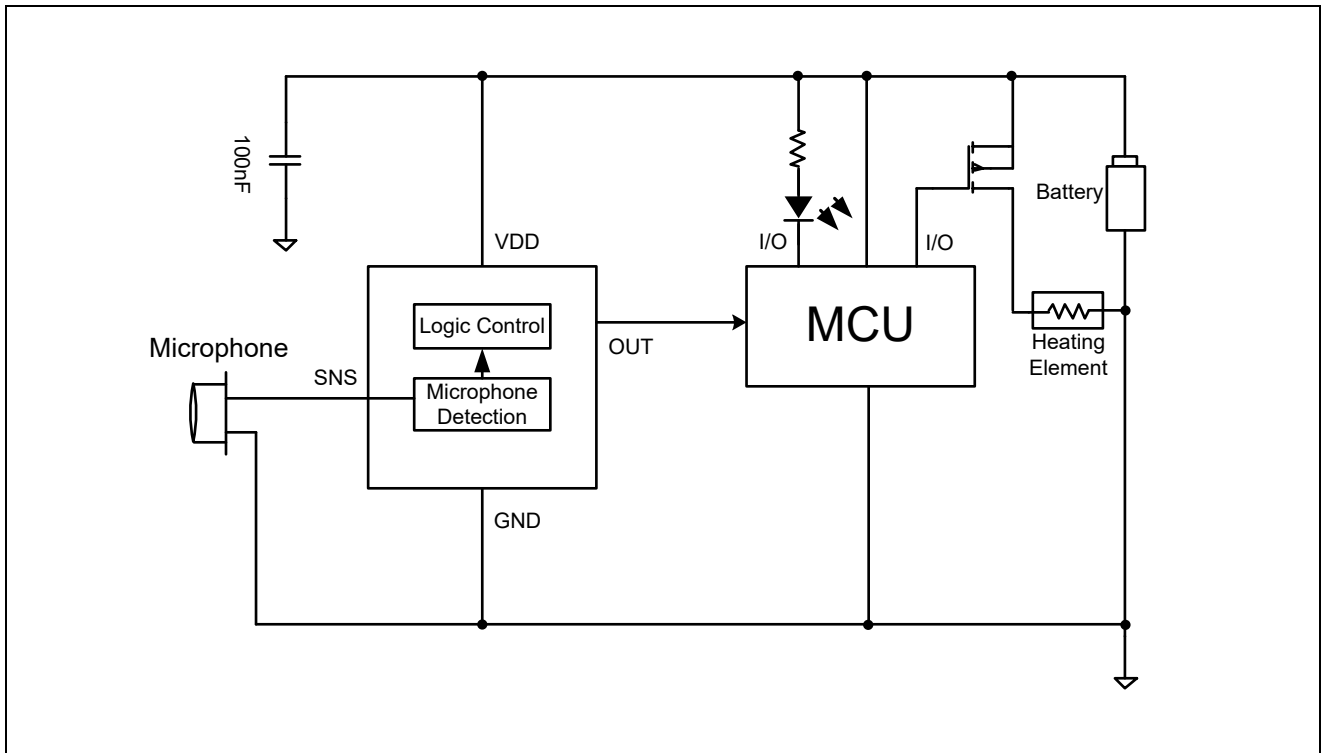
Symbol	Parameters	Conditions	Min	Typ	Max	Unit
$I_Q$	Standby Static Current	$V_{DD} = 4.2V$ , $C_{SNS} = 10pF^{(1)}$		2.9	4.5	$\mu A$
$f_{OUT}$	Output Frequency (ET60xBFB)	Light Inhalation Output	2.8	3.125	3.4	kHz
		Heavy Inhalation Output	5.6	6.25	6.8	kHz
$K_{HVV}$	Heavy Inhalation Times (ET60xBFB)	$V_{DD} = 2.5V$ to $4.2V$ , $T_A = 25^\circ C$		4		
$t_{LOW}$	Low-level Pulse Width	$V_{DD} = 2.5V$ to $4.2V$ , $T_A = 25^\circ C$	18	20	22	$\mu s$
$t_{OUT}$	Output Response Time	$V_{DD} = 4.2V^{(2)}$		50	70	ms
$t_{TO}$	Smoke Timeout Threshold	$V_{DD} = 4.2V^{(2)}$	13	15	17	s
$t_R$	Output Rise Time	$V_{DD} = 2.8V$ to $4.2V$ , $C_{LOAD} = 10pF$ , Time from 10% to 90% $V_{OUT}^{(2)}$			30	ns
$t_F$	Output Fall Time	$V_{DD} = 2.8V$ to $4.2V$ , $C_{LOAD} = 10pF$ , Time from 90% to 10% $V_{OUT}^{(2)}$			30	ns
$V_{OL}$	Output Low Voltage Level	$V_{DD} = 2.8V$ to $4.2V$ , $R_{LOAD} = 10k\Omega^{(2)}$			0.3	V
$V_{OH}$	Output High Voltage Level	$V_{DD} = 2.8V$ to $4.2V$ , $R_{LOAD} = 10k\Omega^{(2)}$	$V_{DD} - 0.3$			V

**Note1.** This parameter is based on the application of a 10pF SNS capacitor.

**Note2.** This parameter has been verified by design and laboratory tests and will not be subject to further testing during mass production.

# ET601/ET603

## Application Circuit

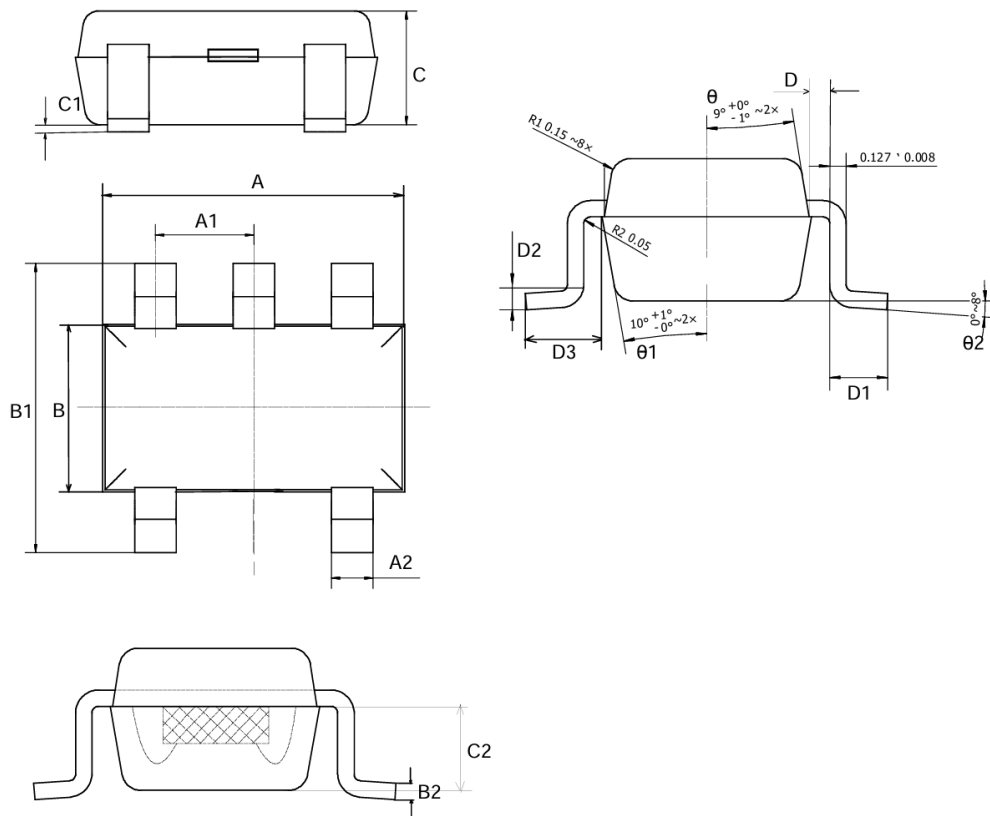




# ET601/ET603

## Package Dimension

SOT23-5

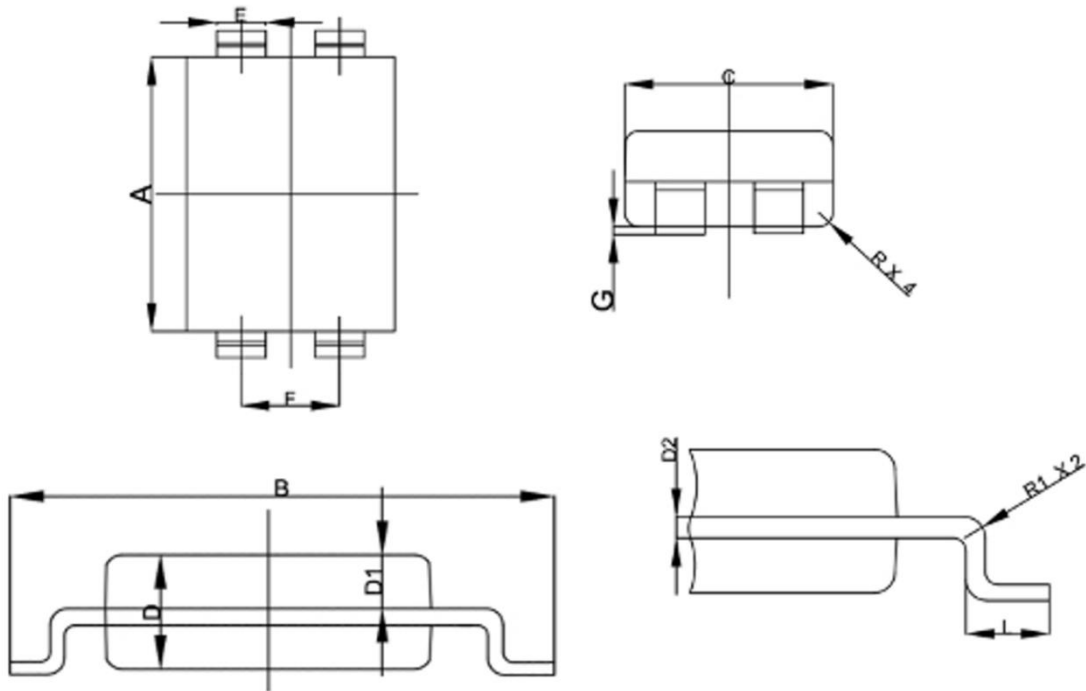


Dimensions Table (Units:mm)

Symbol	Min	Typ	Max
A	2.82	2.92	3.02
A1	0.90	0.95	1.00
A2	0.30	0.37	0.45
B	1.52	1.62	1.72
B1	2.70	2.85	3.00
B2	0.12	0.128	0.135
C	1.05	1.10	1.15
C1	0.03	0.08	0.13
C2	0.60	0.65	0.70
D	0.03	0.08	0.13
D1	0.35	0.45	0.55
D2	0.25 TYP		
D3	0.60	0.65	0.70

# ET601/ET603

MSOT-4

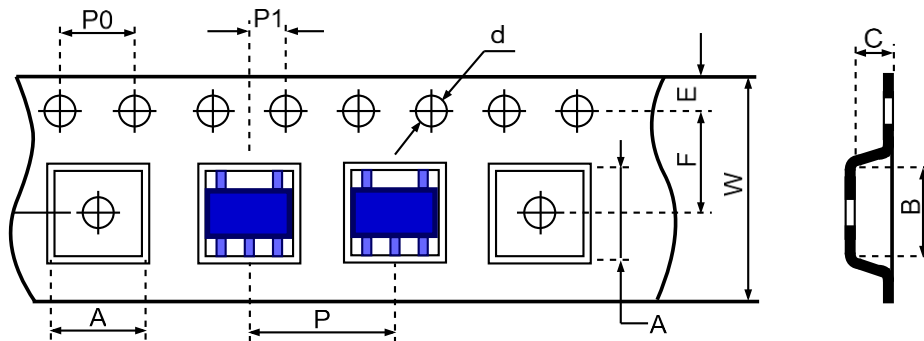


Dimensions Table (Units:mm)

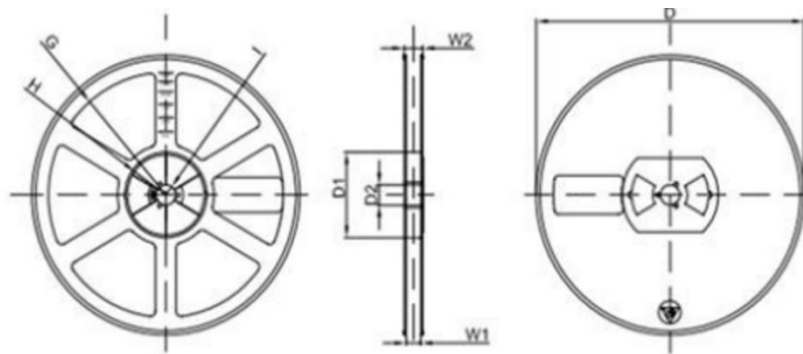
Symbol	Min	Typ	Max
A	1.90	1.95	2.00
B	2.70	2.80	2.90
C	1.40	1.50	1.60
D	0.65	0.70	0.75
D1	0.34	0.36	0.38
D2	0.095	0.100	0.105
E	0.30	0.35	0.40
F	0.70 BSC		
G	0.00	0.04	0.08
L	0.20	0.30	0.40
R	0.10 TYP		
R1	0.05 TYP		

# ET601/ET603

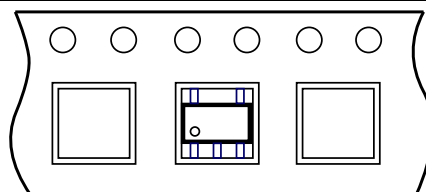
## Tape Information



Symbol	A	B	C	d	E	F	P0	P	P1	W
Central Value	3.20	3.18	1.38	φ 1.50	1.75	3.50	4.00	4.00	2.00	8.00
Tolerance	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1	+0.3/-0.



Symbol	D	D1	D2	G	H	I	W1	W2
Central Value	φ 178.0	54.4	13.0	R78.0	R25.6	R6.5	9.0	11.3
Tolerance	± 2	± 1	± 1	± 1	± 1	± 1	± 1	± 1



User Direction of Feed



Package	Pack	Material Color	PCS/Reel	Tape/Box	Box/Case	Total Quantity
SOT23-5	Tape	Roller - Blue Anti-static Bag	3000	15	4	180000

# ET601/ET603

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Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2025-09-23	Official Version	Licx	Wanggp	Liu jy