

Description:

This N+P Channel MOSFET uses advanced trench technology and design to provide excellent $R_{DS(on)}$ with low gate charge.

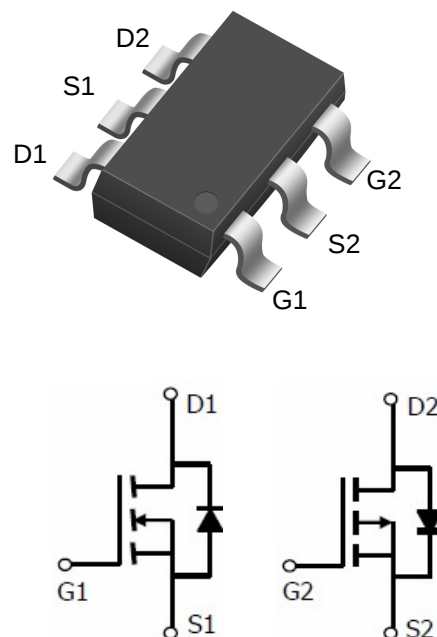
It can be used in a wide variety of applications.

Features:

N-Channel: $V_{DS}=60V, I_D=2A, R_{DS(on)} < 80m\Omega @ V_{GS}=10V$ (Typ: $60m\Omega$)

P-Channel: $V_{DS}=-60V, I_D=-1.5A, R_{DS(on)} < 200m\Omega @ V_{GS}=-10V$ (Typ: $155m\Omega$)

- 1) Low gate charge.
- 2) Green device available.
- 3) Advanced high cell density trench technology for ultra low $R_{DS(on)}$.
- 4) Excellent package for good heat dissipation.
- 6) MSL3



Package Marking and Ordering Information:

Part NO.	Marking	Package	Packing
DO4612R	4612R	SOT-23-6D	3000pcs/Reel

Absolute Maximum Ratings: ($T_A=25^\circ C$ unless otherwise noted)

Symbol	Parameter	N-Channel	P-Channel	Units
V_{DS}	Drain-Source Voltage	60	-60	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
I_D	Continuous Drain Current- $T_A=25^\circ C^1$	2.3	-1.5	A
	Continuous Drain Current- $T_A=100^\circ C^1$	1.6	-1.05	
I_{DM}	Pulsed Drain Current ²	9.2	-6	A
P_D	Power Dissipation	1	1.2	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150		$^\circ C$

Thermal Characteristics:

Symbol	Parameter	N-CH	P-CH	Units
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	120	104	$^\circ C/W$

N-Channel Electrical Characteristics: ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Sourctce Breakdown Voltage	V _{GS} =0V, I _D =250 μ A	60	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _{DS} =60V	---	---	1	μ A
I _{GSS}	Gate-Source Leakage Current	V _{GS} =± 20V, V _{DS} =0A	---	---	± 100	nA
On Characteristics						
V _{GS(th)}	Gate-Source Threshold Voltage	V _{GS} =V _{DS} , I _D =250 μ A	1	1.5	2.5	V
R _{DS(on)}	Drain-Source On Resistance ³	V _{GS} =10V, I _D =3A	---	60	80	m Ω
		V _{GS} =4.5V, I _D =2A	---	72	100	m Ω
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =25V, V _{GS} =0V, f=1MHz	---	370	---	pF
C _{oss}	Output Capacitance		---	30	---	
C _{rss}	Reverse Transfer Capacitance		---	24	---	
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DS} =30V, I _D =2A, R _{ENG} =3 Ω ,V _{GS} =10V	---	5	---	ns
t _r	Rise Time		---	7	---	ns
t _{d(off)}	Turn-Off Delay Time		---	38.8	---	ns
t _f	Fall Time		---	23	---	ns
Q _g	Total Gate Charge	V _{GS} =10V, V _{DS} =30V, I _D =3A	---	5.1	---	nC
Q _{gs}	Gate-Source Charge		---	1.5	---	nC
Q _{gd}	Gate-Drain “Miller” Charge		---	2	---	nC
Drain-Source Diode Characteristics						
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _{SD} =3A	---	---	1.2	V
I _S	Continuous Drain Curren	V _D =V _G =0V	---	---	1.9	A
I _{SM}	Pulsed Drain Current		---	---	7.6	A

Notes:

1. Computed continuous current assumes the condition of $T_{j,Max}$ while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

Test Circuit

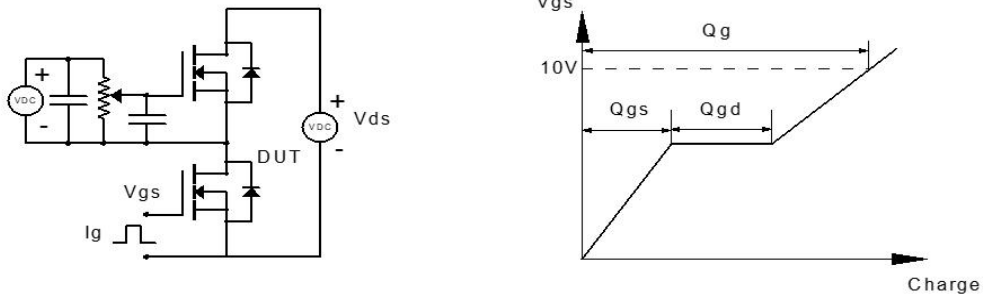


Figure 1: Gate Charge Test Circuit & Waveform

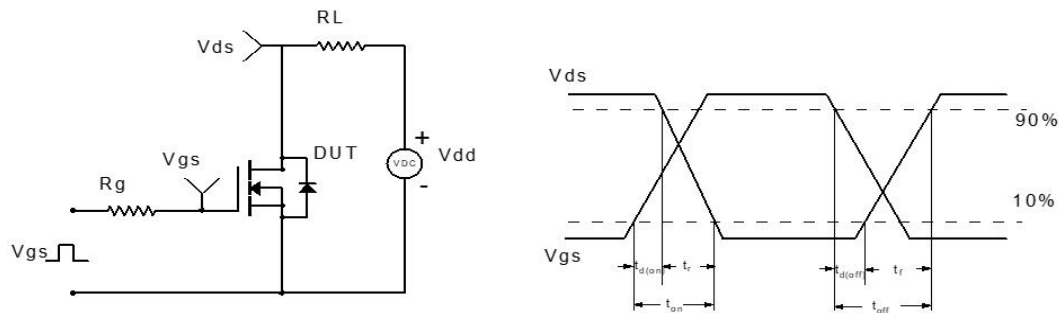


Figure 2: Resistive Switching Test Circuit & Waveform

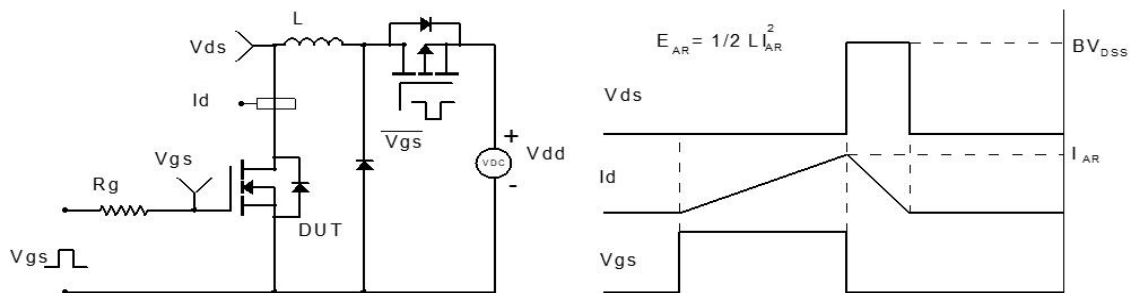


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

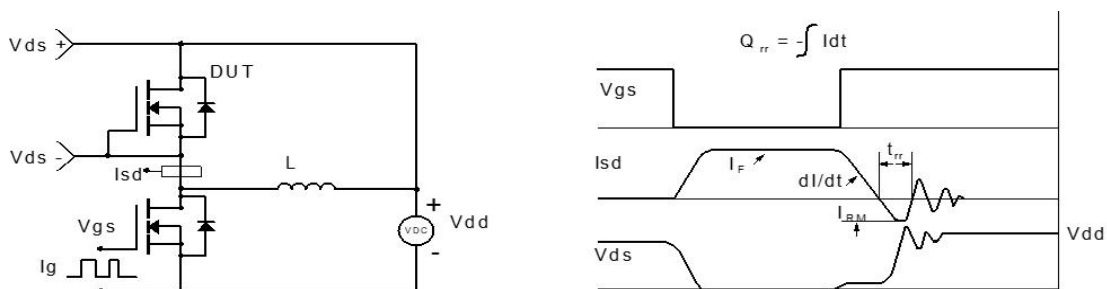


Figure 4: Diode Recovery Test Circuit & Waveform

P-Channel Electrical Characteristics: ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Sourtce Breakdown Voltage	V _{GS} =0V, I _D =250 μ A	-60	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _{DS} =-60V	---	---	-1	μ A
I _{GSS}	Gate-Source Leakage Current	V _{GS} =± 20V, V _{DS} =0A	---	---	± 100	nA
On Characteristics						
V _{GS(th)}	Gate-Source Threshold Voltage	V _{GS} =V _{DS} , I _D =250 μ A	-1	-1.65	-2.5	V
R _{DS(ON)}	Drain-Source On Resistance ³	V _{GS} =-10V, I _D =-1.5A	---	155	200	m Ω
		V _{GS} =-4.5V, I _D =-1A	---	195	250	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =-25V, V _{GS} =0V, f=1MHz	---	500	---	pF
C _{OSS}	Output Capacitance		---	30	---	
C _{rSS}	Reverse Transfer Capacitance		---	24	---	
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} = -30V, I _D =-1.5A V _{GS} = -10V, R _{GEN} =3 Ω	---	47	---	ns
t _r	Rise Time		---	34.6	---	ns
t _{d(off)}	Turn-Off Delay Time		---	15	---	ns
t _f	Fall Time		---	11	---	ns
Q _g	Total Gate Charge	V _{GS} =-10V, V _{DS} =-30V, I _D =-1.5A	---	9.5	---	nC
Q _{gs}	Gate-Source Charge		---	1.5	---	nC
Q _{gd}	Gate-Drain “Miller” Charge		---	2	---	nC
Drain-Source Diode Characteristics						
I _S	Continuous Drain to Source Diode	V _D =V _G =0V	---	---	-1.25	A
I _{SM}	Pulsed Drain to Source Diode		---	---	-5	---
V _{SD}	Source-Drain Diode Forward Voltage	V _{GS} =0V, I _S =-1.5A	---	---	-1.2	V
T _{rr}	Reverse Recovery Time	I _F =1.5A, T _J =25 °C	---	26	---	ns
Q _{rr}	Reverse Recovery C45rge	dl/dt=39A/us	---	28	---	μ C

Notes:

1. Computed continuous current assumes the condition of $T_{j,Max}$ while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

Test Circuit

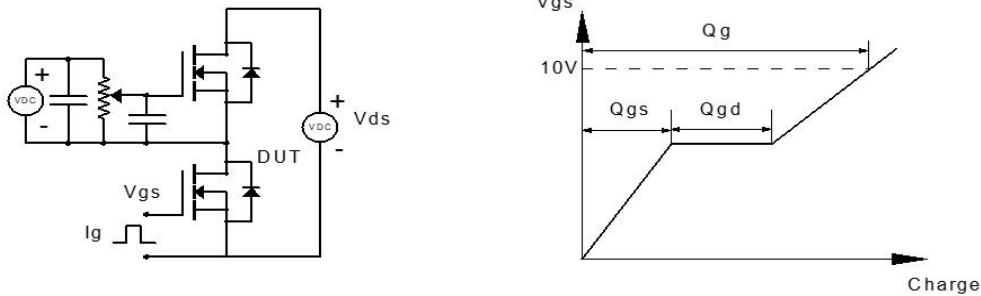


Figure 1: Gate Charge Test Circuit & Waveform

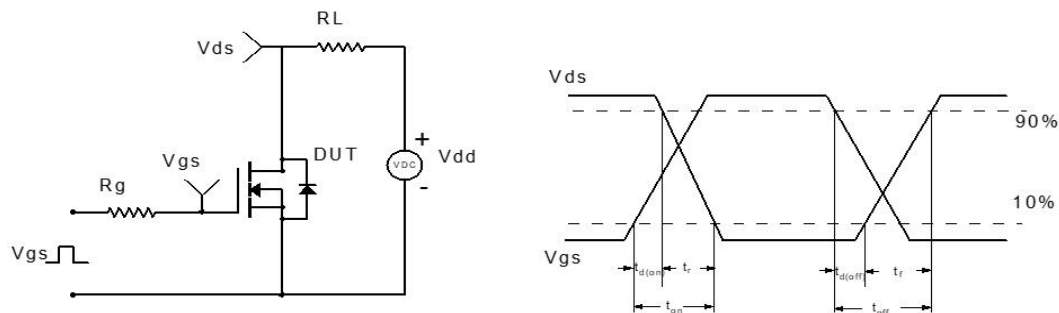


Figure 2: Resistive Switching Test Circuit & Waveform

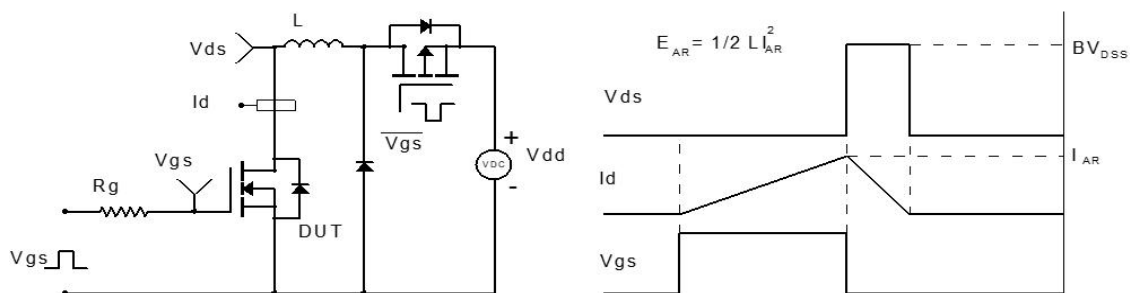


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

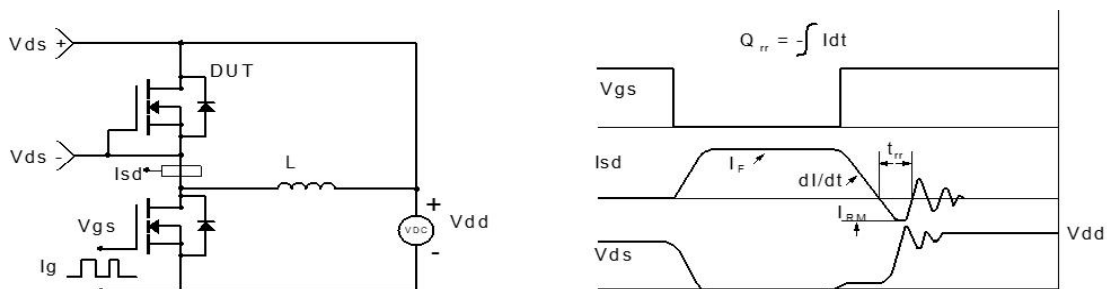
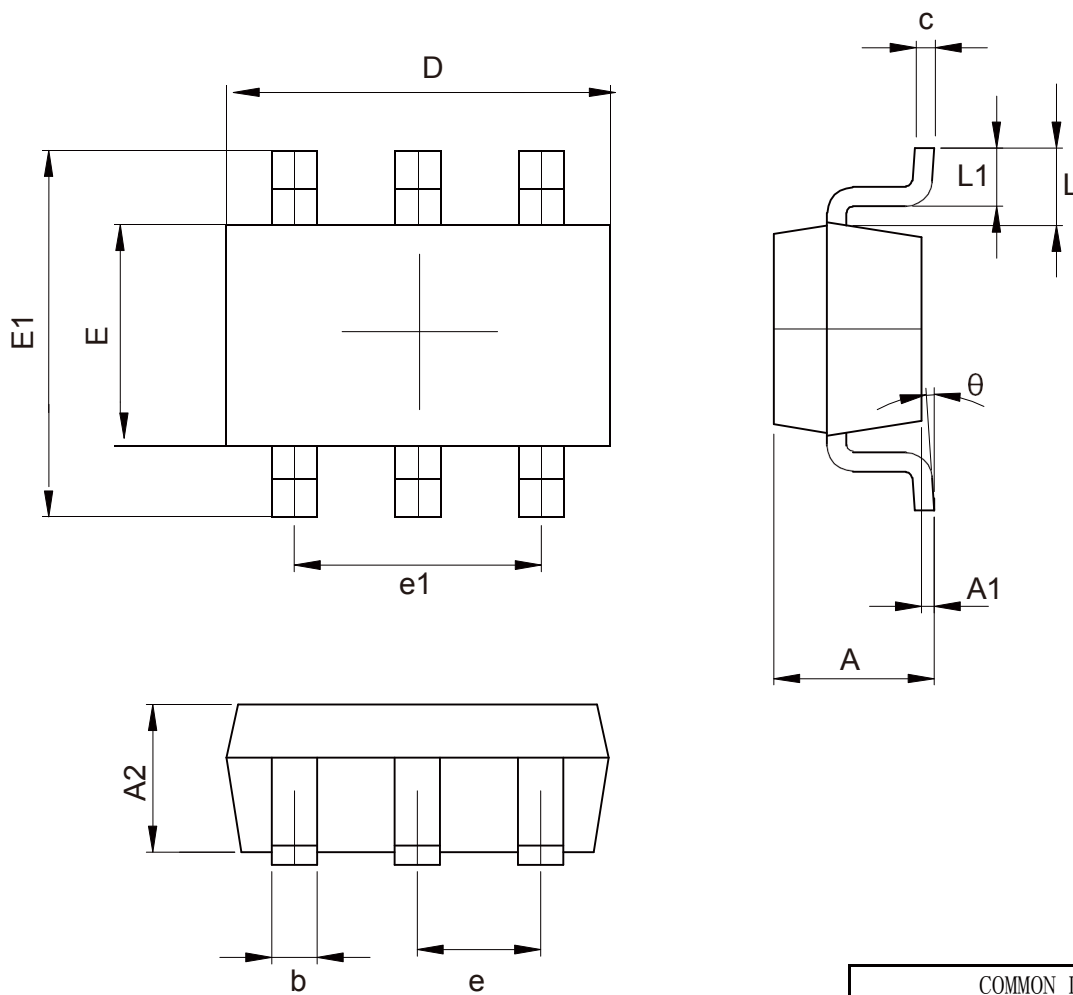


Figure 4: Diode Recovery Test Circuit & Waveform

SOT-23-6D Package Outline Data

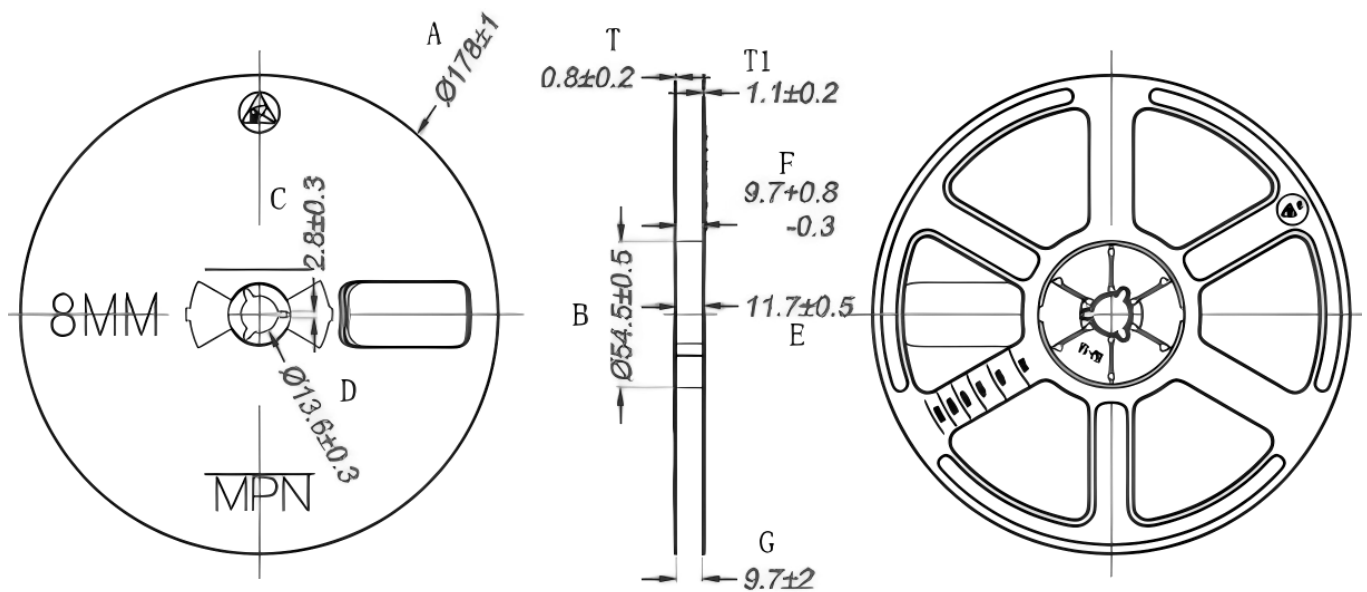


COMMON DIMENSIONS CUNITS MEASURE=MILLIMETER			
SYMBOL	MIN	NOM	MAX
A	1.050	—	1.300
A1	0.000	—	0.200
A2	1.050	—	1.200
b	0.300	0.400	0.500
c	0.100	—	0.200
D	2.820	2.900	3.020
E	1.500	1.600	1.700
E1	2.650	2.800	2.950
e	0.950TYP		
e1	1.800	1.900	2.000
L	0.6REF		
L1	0.300	0.450	0.600
θ	0°	—	8°

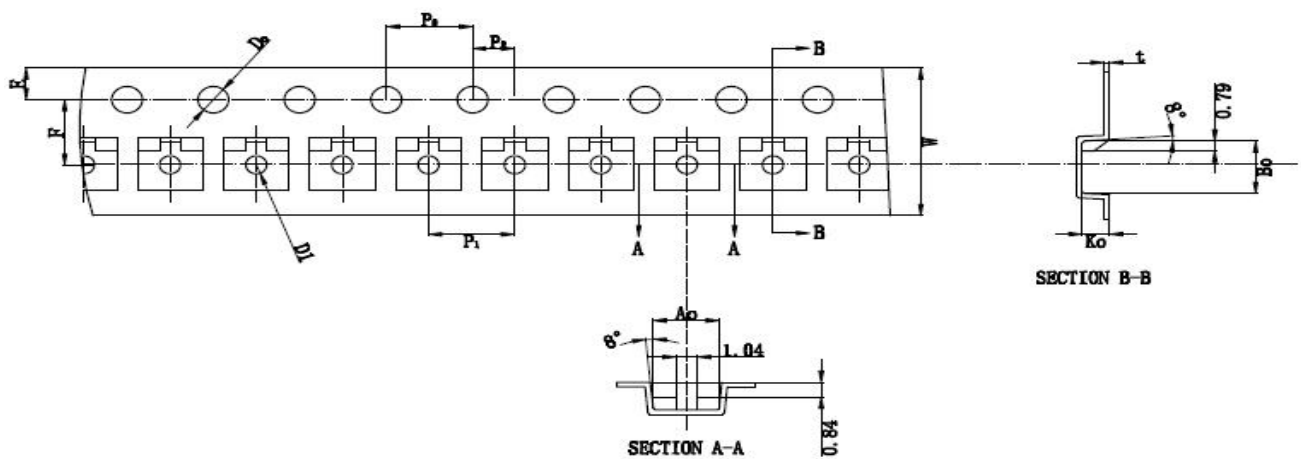
Unit:mm

Tape & Reel Information

Dimensions in mm

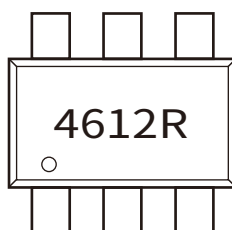


PKG TYPE	W	P	E	F	D	D1	Po	Po10	P2	A0	B0	K0	T
SOT23-6	8.00	4.00	1.75	3.50	1.50	1.00	4.00	40.00	2.00	3.13	3.22	1.30	0.20
Tolerance	± 0.2	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1	± 0.2	± 0.1	± 0.1	± 0.1	± 0.1	± 0.03



Pulling direction 

Marking Information:



Previous Version

Version	Date	Subjects (major changes since last revision)
1.0	2025-10-26	Release of final version

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