



TM02P02I

P-Channel Enhancement Mosfet

General Description

- Low $R_{DS(ON)}$
- RoHS and Halogen-Free Compliant

Applications

- Load switch
- PWM

General Features

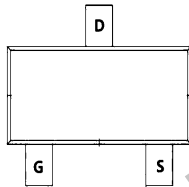
$V_{DS} = -20V$ $I_D = -2.3A$

$R_{DS(ON)} = 90m\Omega$ (typ.) @ $V_{GS} = -4.5V$

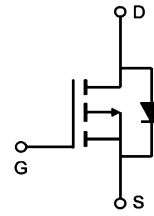
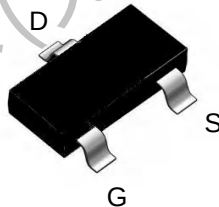
100% UIS Tested
100% R_g Tested



I: SOT-23



Marking: A1SHB



Absolute Maximum Ratings $T_A = 25^\circ C$ un(less otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	± 12	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V$	-2.3	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V$	-1.3	A
I_{DM}	Pulsed Drain Current ²	-12	A
P_D	Total Power Dissipation ³	0.7	W
T_{STG}	Storage Temperature Range	-55 to 175	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 175	$^\circ C$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient ¹	---	162	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	---	$^\circ C/W$

TM02P02I
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Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-20V, V_{GS}=0V$	-	-	-1	μA
I_{GSS}	Gate-Body Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0V$	-	-	± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.4	-0.65	-1.0	V
$R_{DS(on)}$	Drain-Source On-State Resistance	$V_{GS}=-4.5V, I_D=-2A$	-	90	102	m Ω
		$V_{GS}=-2.5V, I_D=-1.8A$	-	103	135	m Ω
g_{FS}	Forward Transconductance	$V_{DS}=-5V, I_D=-2A$	4	-	-	S
C_{iss}	Input Capacitance	$V_{DS}=-10V, V_{GS}=0V,$ $F=1.0MHz$	-	290	-	PF
C_{oss}	Output Capacitance		-	60	-	PF
C_{rss}	Reverse Transfer Capacitance		-	34	-	PF
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=-10V, R_L=5\Omega, V_{GS}=-4.5V, R_{GEN}=3\Omega$	-	10	-	nS
t_r	Turn-on Rise Time		-	5.0	-	nS
$t_{d(off)}$	Turn-Off Delay Time		-	21	-	nS
t_f	Turn-Off Fall Time		-	7	-	nS
Q_g	Total Gate Charge	$V_{DS}=-10V, I_D=-2A,$ $V_{GS}=-4.5V$	-	3.0	-	nC
Q_{gs}	Gate-Source Charge		-	0.5	-	nC
Q_{gd}	Gate-Drain Charge		-	0.8	-	nC
V_{SD}	Diode Forward Voltage ^(Note 3)	$V_{GS}=0V, I_S=-2A$	-	-	-1.2	V

Notes:

- 1、Repetitive Rating: Pulse width limited by maximum junction temperature.
- 2、Surface Mounted on FR4 Board, $t \leq 10$ sec.
- 3、Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
- 4、Guaranteed by design, not subject to production

TM02P02I

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Typical Characteristics

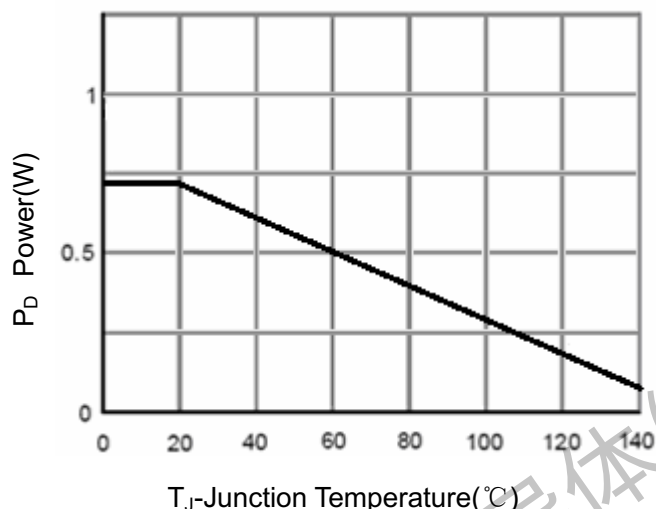


Figure 1 Power Dissipation

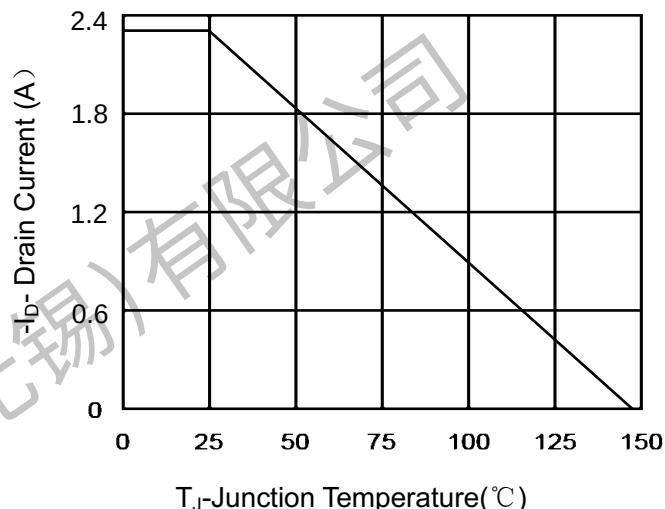


Figure 2 Drain Current

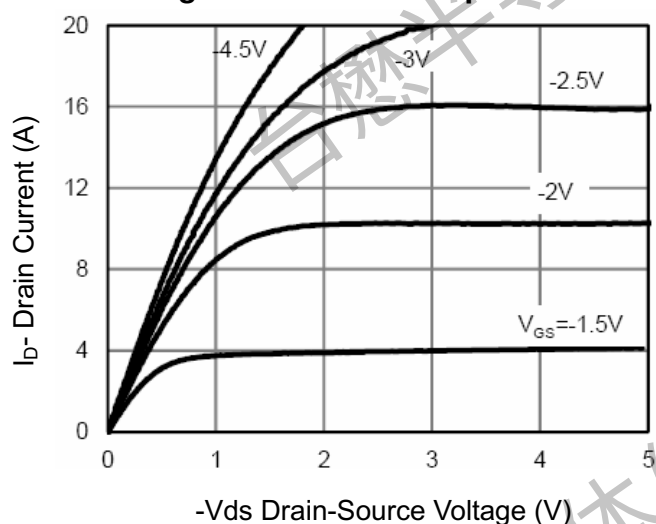


Figure 3 Output Characteristics

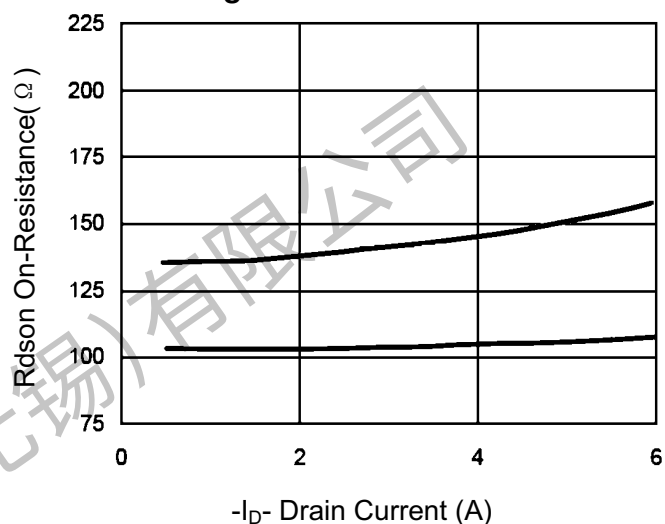


Figure 4 Drain-Source On-Resistance

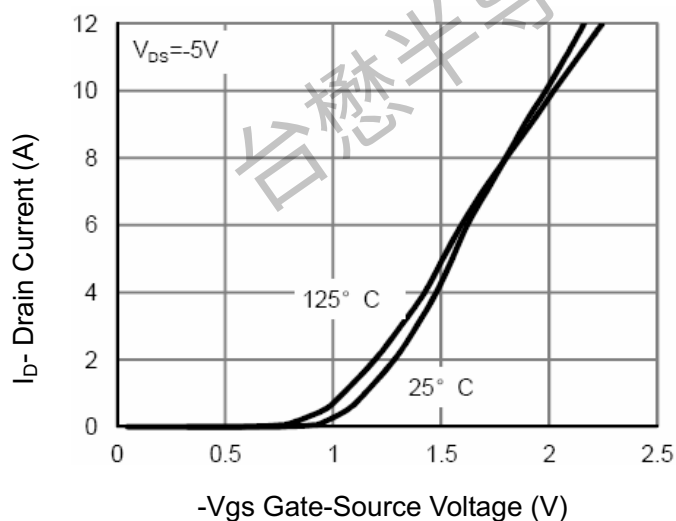


Figure 5 Transfer Characteristics

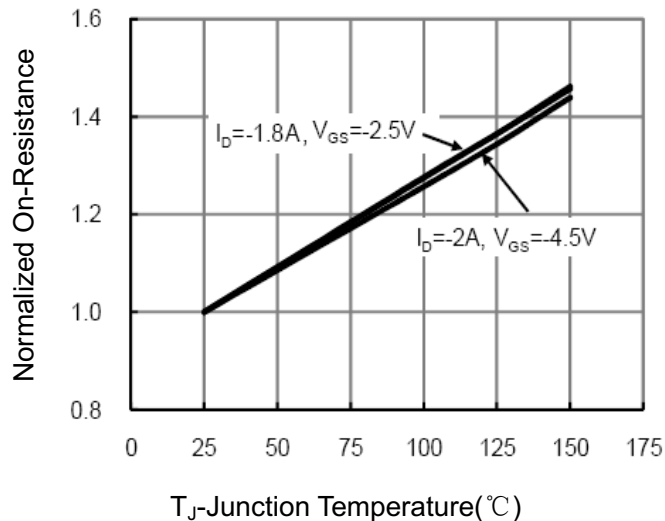


Figure 6 Drain-Source On-Resistance

TM02P02I

P-Channel Enhancement Mosfet

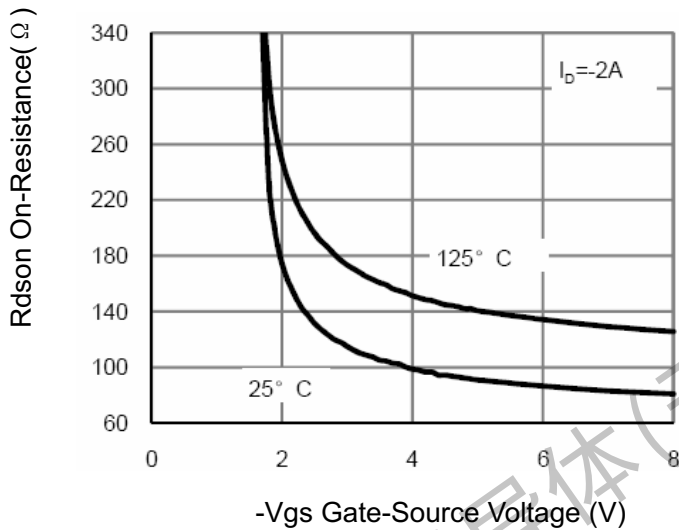


Figure 7 Rdson vs Vgs

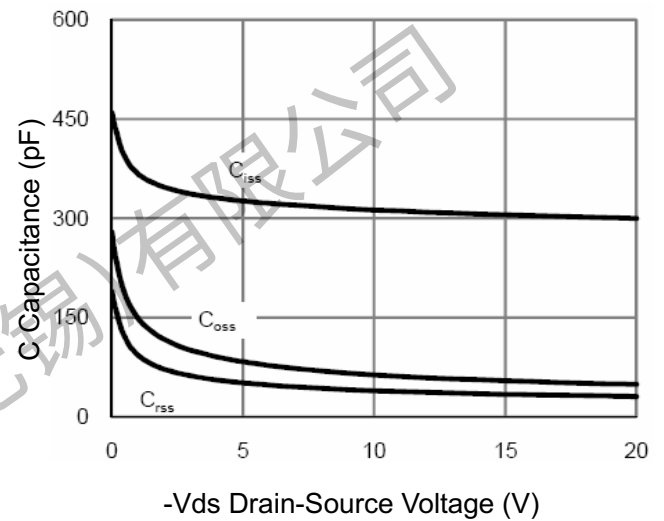


Figure 8 Capacitance vs Vds

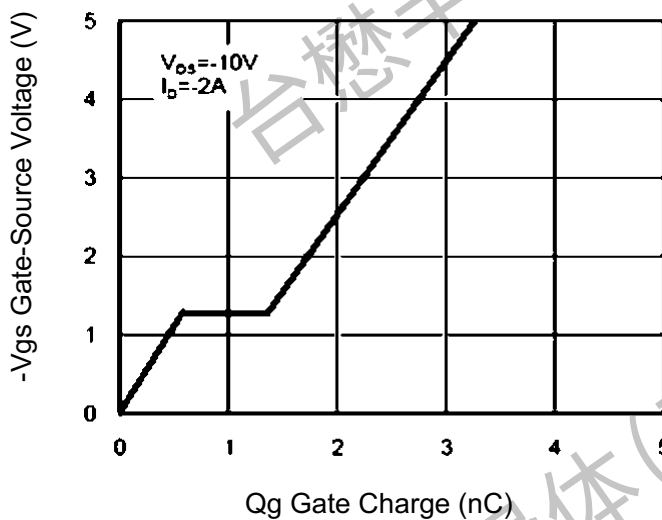


Figure 9 Gate Charge

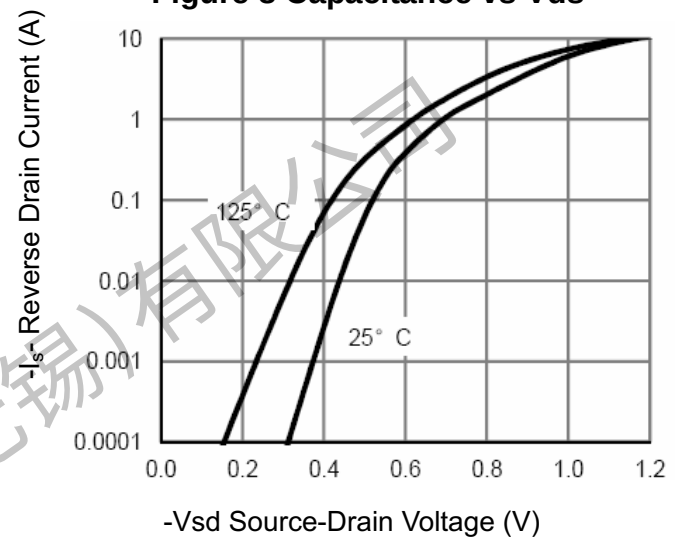


Figure 10 Source- Drain Diode Forward

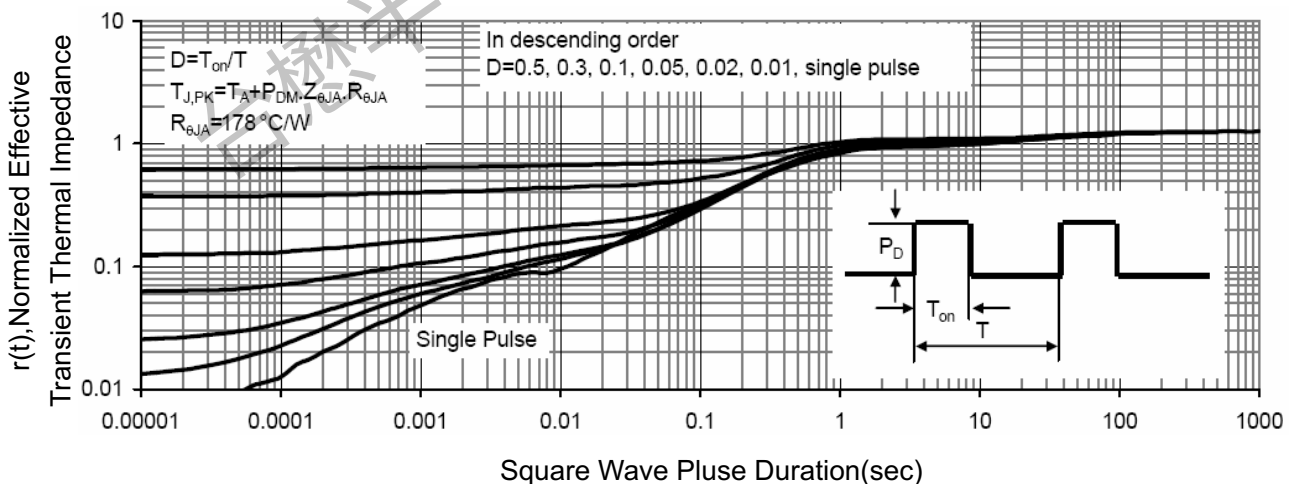
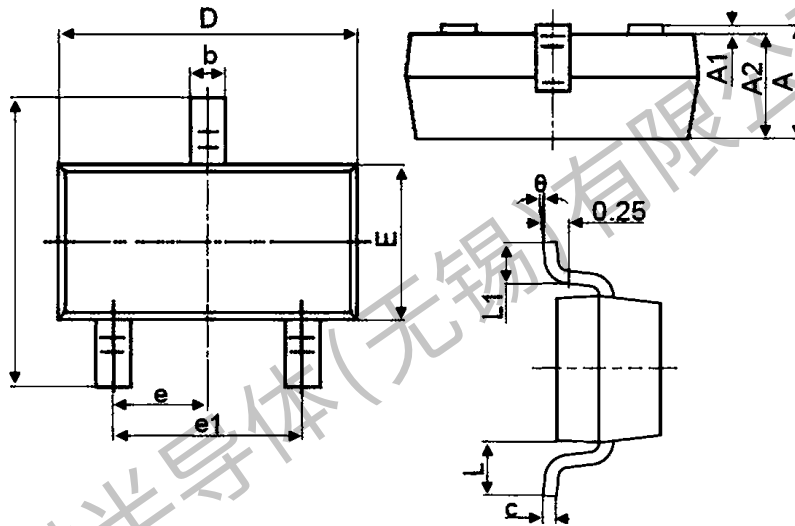


Figure 11 Normalized Maximum Transient Thermal Impedance

TM02P02I

P-Channel Enhancement Mosfet

Package Mechanical Data:SOT-23



Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°

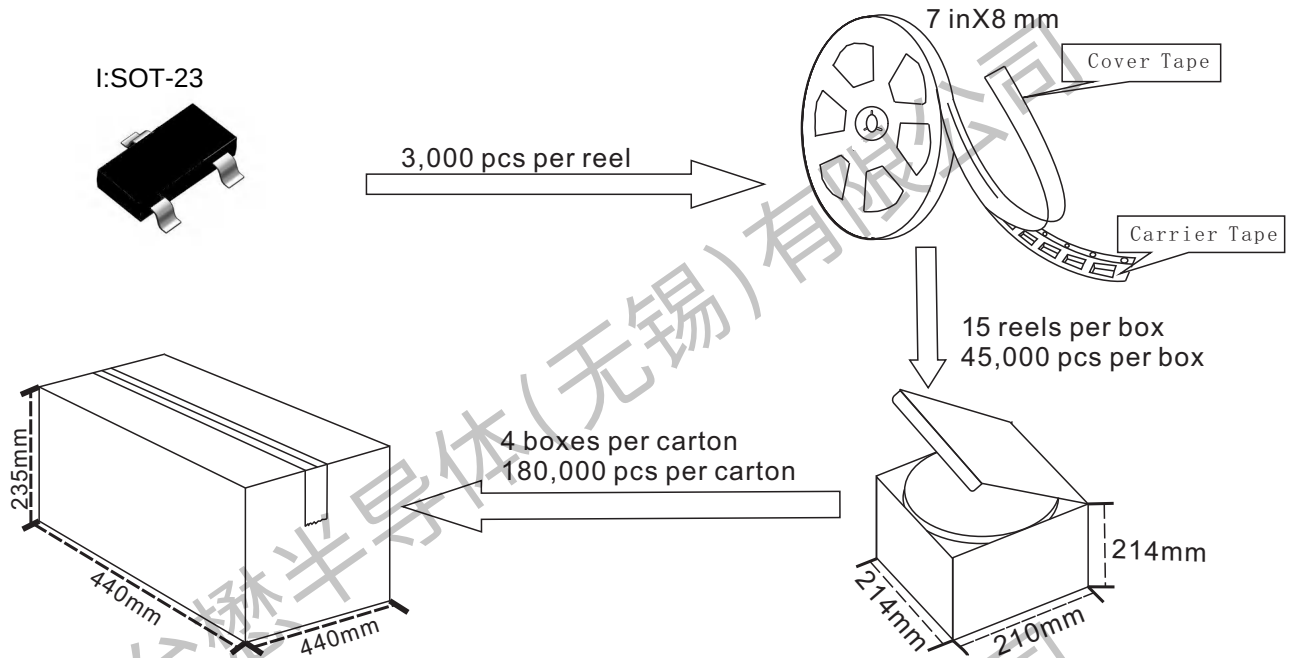


TM02P02I

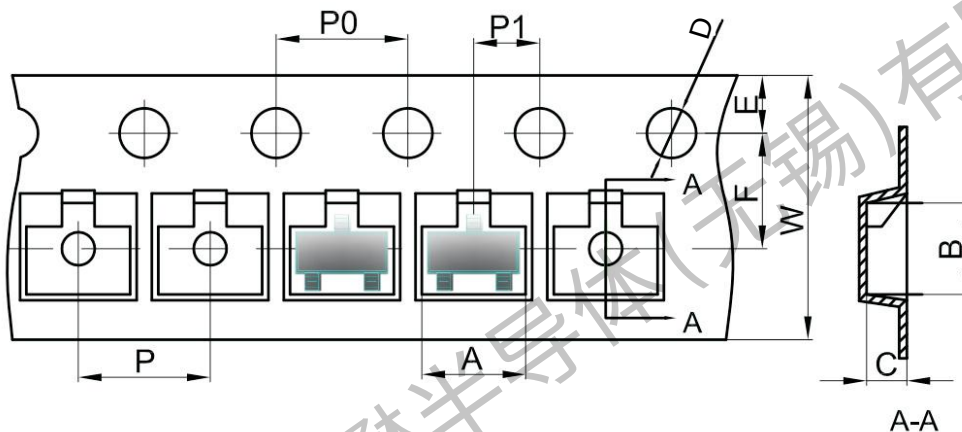
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SOT-23 Packing

1. The method of packaging and dimension are shown as below figure. (Dimension in mm)



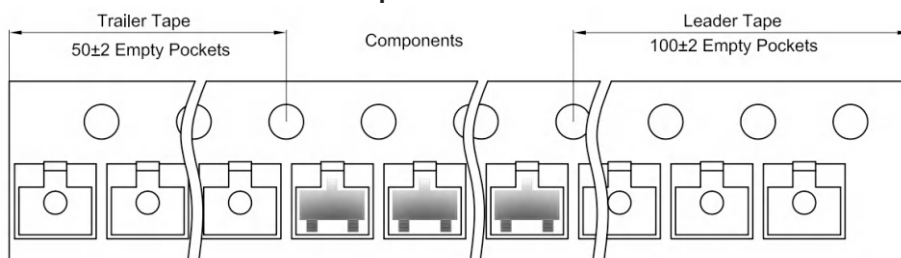
SOT-23 Embossed Carrier Tape



Dimensions are in millimeter

Pkg type	A	B	C	D	E	F	P0	P	P1	W
SOT-23	3.15	2.77	1.22	Ø1.50	1.75	3.50	4.00	4.00	2.00	8.00

SOT-23 Tape Leader and Trailer



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Revision history:

Date	Rev	Description	Page
2023.05.09	23.05	Original	