
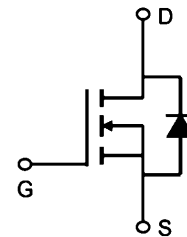
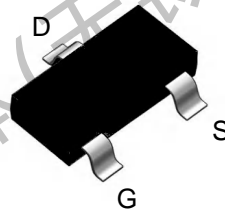
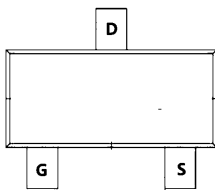


TM04N20MI

N-Channel Enhancement Mosfet

<p>General Description</p> <ul style="list-style-type: none"> • Low $R_{DS(ON)}$ • RoHS and Halogen-Free Compliant <p>Applications</p> <ul style="list-style-type: none"> • Load switch • PWM 	<p>General Features</p> <p>$V_{DS}=200V$ $I_D=4.0A$</p> <p>$R_{DS(ON)} = 500\text{ m}\Omega(\text{Typ.})@ V_{GS}=10V$</p> <p>100% UIS Tested 100% R_g Tested</p>	
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MI:SOT-23-3L



Marking: 4N20

Absolute Maximum Ratings ($T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	200	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_A=25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V$	4	A
I_{DM}	Pulsed Drain Current	8	A
P_D	Total Power Dissipation	1.5	W
T_{STG}	Storage Temperature Range	-55 to 175	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 175	$^\circ\text{C}$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient	---	83.3	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case	---	---	$^\circ\text{C}/\text{W}$

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	200	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=200V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	2.5	3	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=2A$	-	500	560	m Ω
	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=2A$	-	540	600	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=15V, I_D=2A$	-	8	-	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0V,$ $F=1.0\text{MHz}$	-	580	-	PF
Output Capacitance	C_{oss}		-	90	-	PF
Reverse Transfer Capacitance	C_{rss}		-	3	-	PF
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=100V, R_L=15\Omega$ $V_{GS}=10V, R_G=2.5\Omega$	-	10	-	nS
Turn-on Rise Time	t_r		-	12	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	15	-	nS
Turn-Off Fall Time	t_f		-	15	-	nS
Total Gate Charge	Q_g	$V_{DS}=100V, I_D=2A,$ $V_{GS}=10V$	-	12	-	nC
Gate-Source Charge	Q_{gs}		-	2.5	-	nC
Gate-Drain Charge	Q_{gd}		-	3.8	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=2A$	-	-	1.2	V
Diode Forward Current	I_S		-	-	4	A



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Typical Electrical and Thermal Characteristics (Curves)

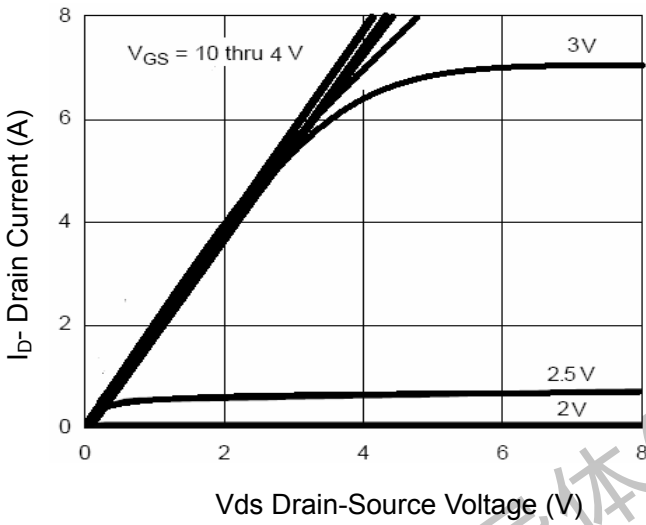


Figure 1 Output Characteristics

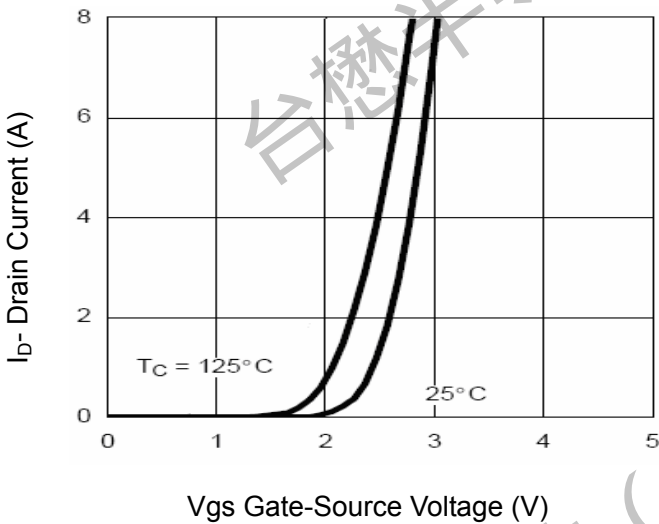


Figure 2 Transfer Characteristics

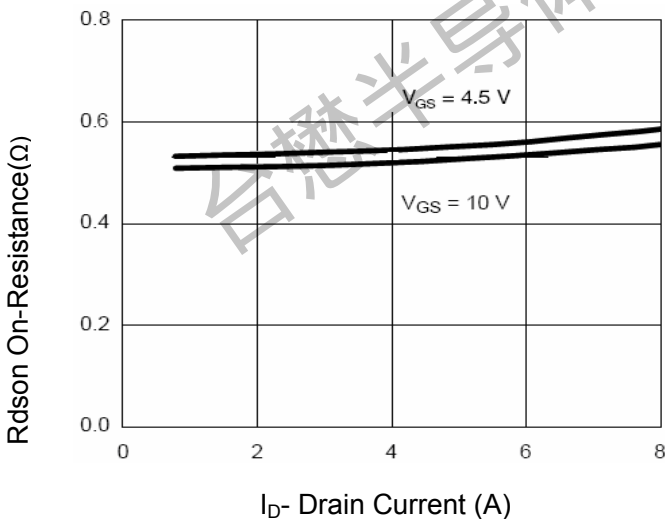


Figure 3 Rdson- Drain Current

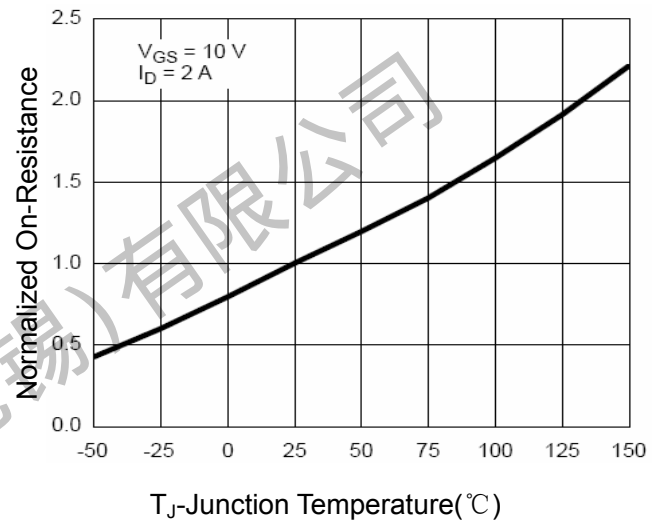


Figure 4 Rdson-Junction Temperature

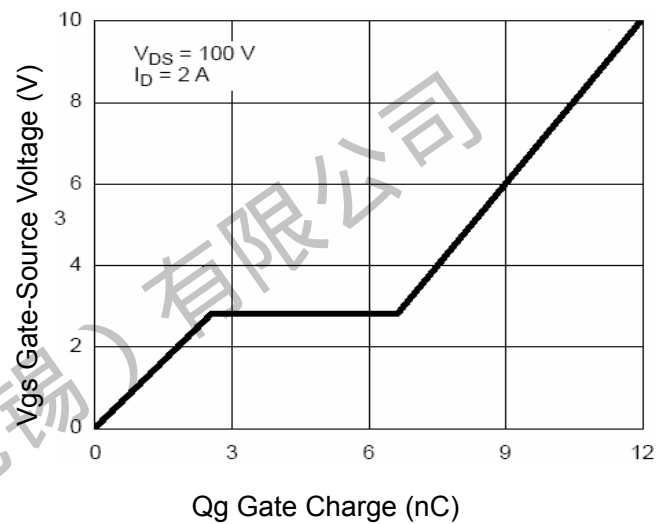


Figure 5 Gate Charge

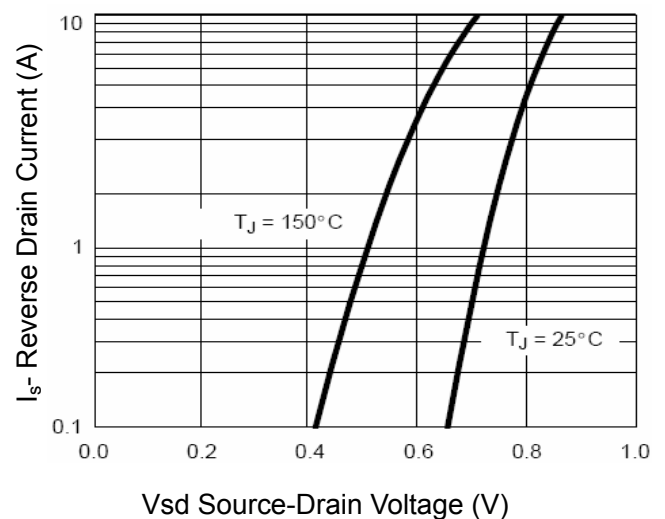
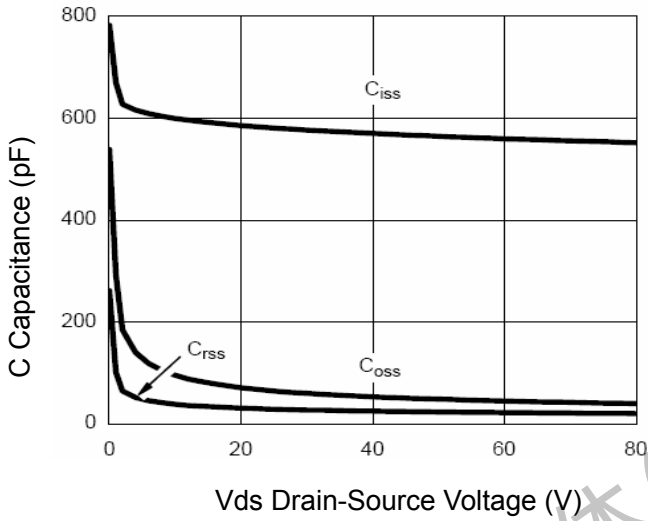


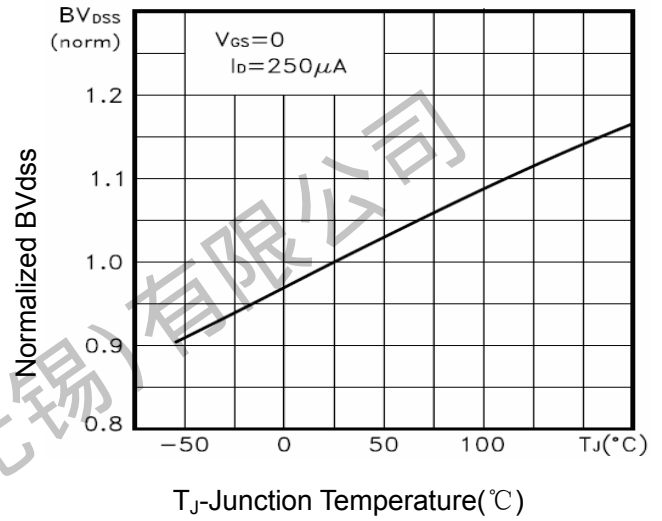
Figure 6 Source- Drain Diode Forward

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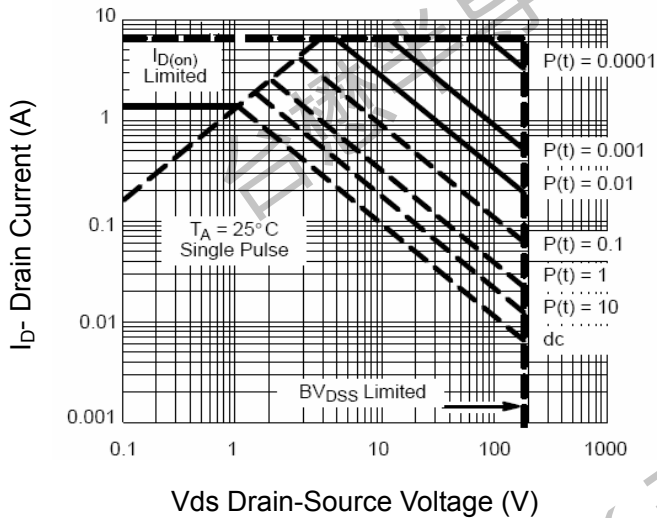
N-Channel Enhancement Mosfet



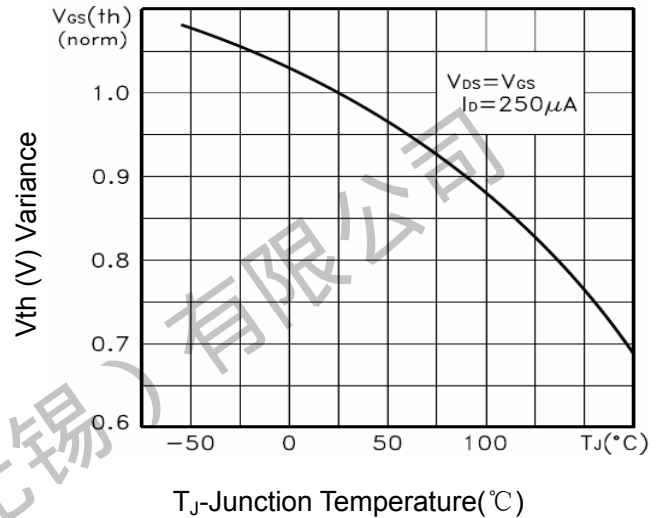
Vds Drain-Source Voltage (V)
Figure 7 Capacitance vs Vds



T_J-Junction Temperature(°C)
Figure 9 BV_{DSS} vs Junction Temperature



Vds Drain-Source Voltage (V)
Figure 8 Safe Operation Area



T_J-Junction Temperature(°C)
Figure 10 V_{GS(th)} vs Junction Temperature

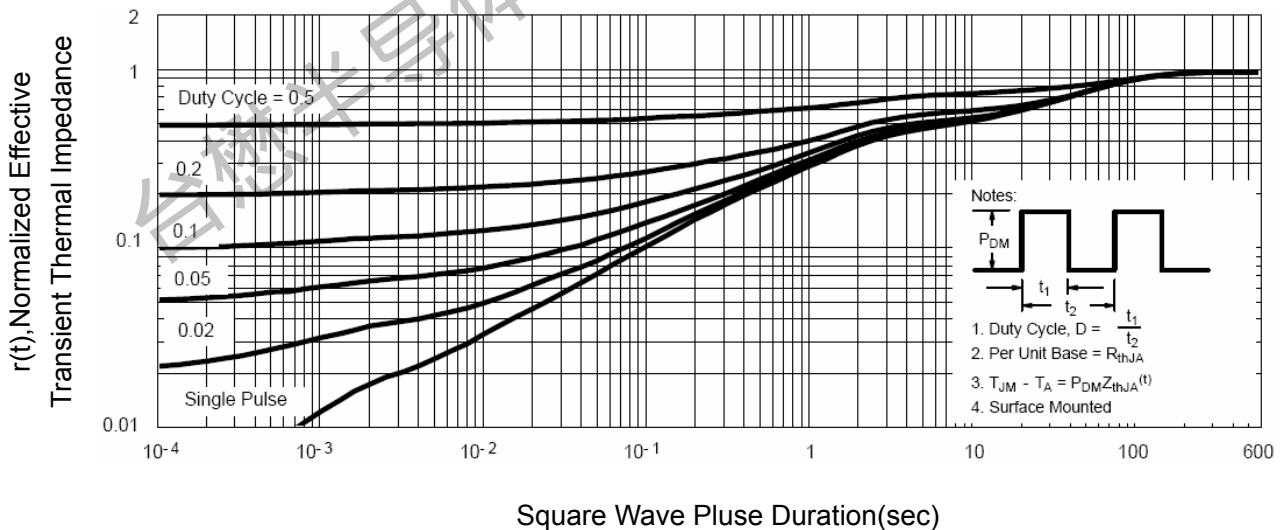
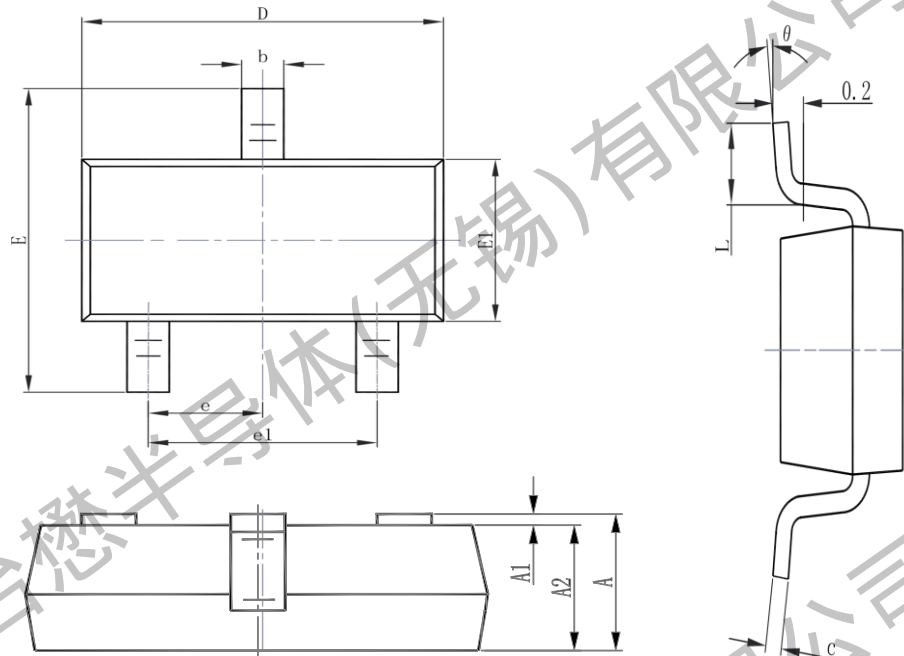


Figure 11 Normalized Maximum Transient Thermal Impedance

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N-Channel Enhancement Mosfet

Package Mechanical Data:SOT-23-3L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

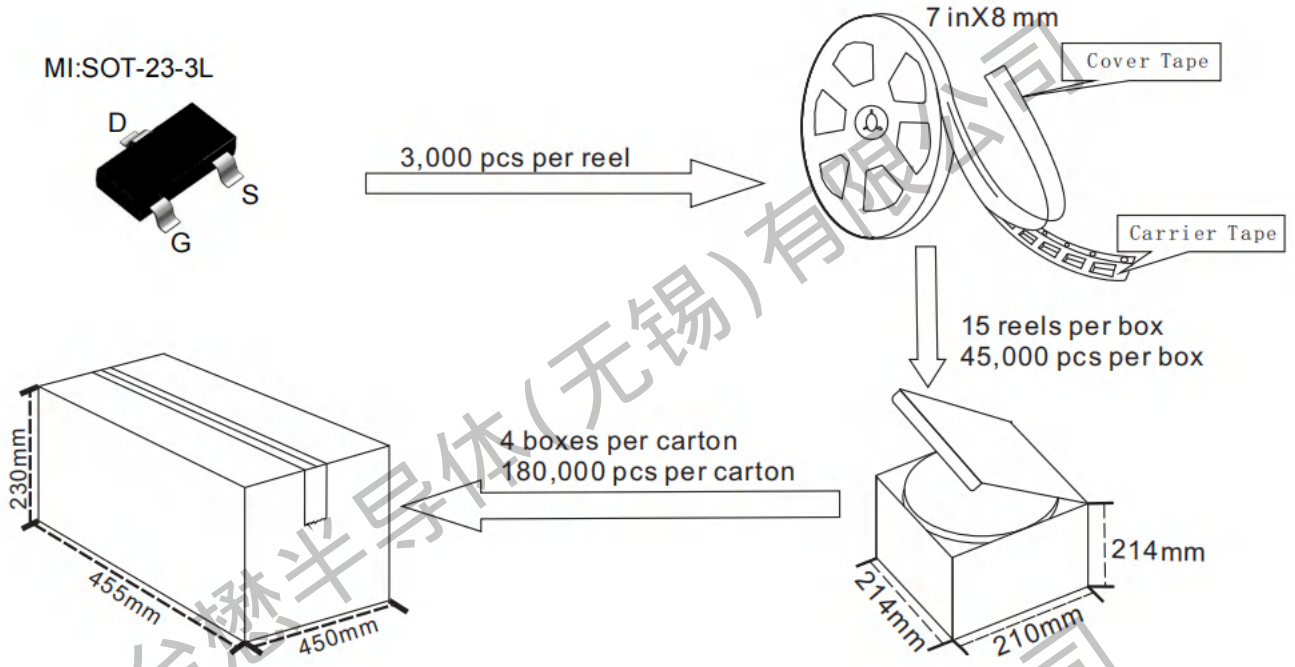


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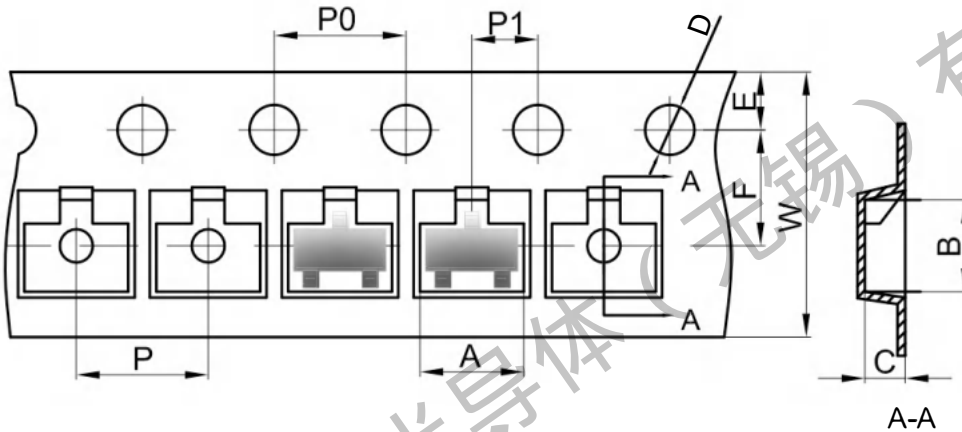
N-Channel Enhancement Mosfet

SOT-23-3L Packing

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



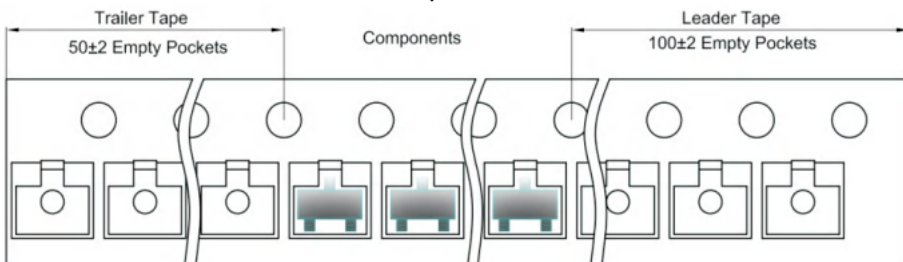
SOT-23-3L Embossed Carrier Tape



Dimensions are in millimeter

Pkg type	A	B	C	D	E	F	P0	P	P1	W
SOT-23-3L	3.40	3.0	1.22	Ø1.50	1.75	3.50	4.00	4.00	2.00	8.00

SOT-23-3LTape Leader and Trailer



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Revision history:

Date	Rev	Description	Page
2024.06.10	24.06	Original	