



**TM04N03I**

**N-Channel Enhancement Mosfet**

<p><b>General Description</b></p> <ul style="list-style-type: none"> <li>• Low <math>R_{DS(ON)}</math></li> <li>• RoHS and Halogen-Free Compliant</li> </ul> <p><b>Applications</b></p> <ul style="list-style-type: none"> <li>• Load switch</li> <li>• PWM</li> </ul>	<p><b>General Features</b></p> <p><math>V_{DS} = 30V</math> <math>I_D = 3.8A</math>  <math>R_{DS(ON)} = 44m\Omega @ V_{GS}=10V</math></p> <p>100% UIS Tested          100% <math>R_g</math> Tested</p>
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I: SOT-23

Marking: A6

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

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_A=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	3.8	A
$I_D @ T_A=70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	2.6	A
$I_{DM}$	Pulsed Drain Current	16.4	A
$P_D @ T_A=25^\circ C$	Total Power Dissipation	1	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	---	125	$^\circ C / W$
$R_{\theta JC}$	Thermal Resistance Junction-Case	---	80	$^\circ C / W$

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### Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	30	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V,	-	-	1.0	μA
I <sub>GSS</sub>	Gate to Body Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V	-	-	±100	nA
<b>On Characteristics</b>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	0.9	1.2	1.5	V
R <sub>DS(on)</sub>	Static Drain-Source on-Resistance <small>note2</small>	V <sub>GS</sub> =10V, I <sub>D</sub> =4A		44	59	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =3A	-	60	65	
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1.0MHz		183		pF
C <sub>oss</sub>	Output Capacitance		-	44	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	33	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =15V, I <sub>D</sub> =2A, V <sub>GS</sub> =10V	-	3	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	0.5	-	nC
Q <sub>gd</sub>	Gate-Drain("Miller") Charge		-	0.8	-	nC
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DS</sub> =15V, I <sub>D</sub> =4A, R <sub>GEN</sub> =3Ω, V <sub>GS</sub> =10V	-	4	-	ns
t <sub>r</sub>	Turn-on Rise Time		-	2.1	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time		-	15	-	ns
t <sub>f</sub>	Turn-off Fall Time		-	3.2	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Maximum Continuous Drain to Source Diode Forward Current		-		3.8	A
I <sub>SM</sub>	Maximum Pulsed Drain to Source Diode Forward Current		-	-	16	A
V <sub>SD</sub>	Drain to Source Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =4A	-	-	1.2	V

### Typical Performance Characteristics

Figure 1: Output Characteristics

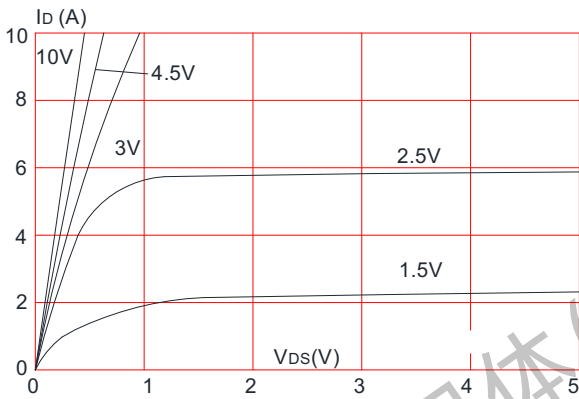


Figure 2: Typical Transfer Characteristics

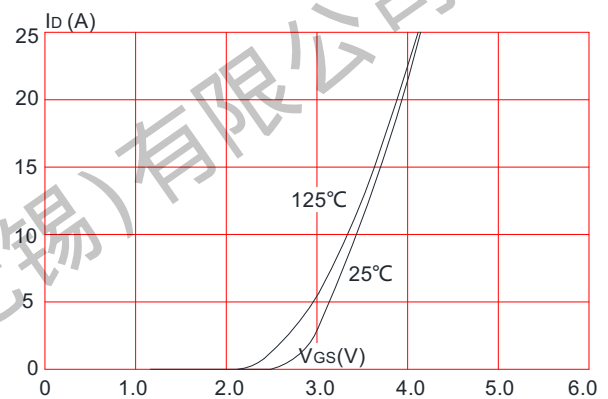


Figure 3: On-resistance vs. Drain Current

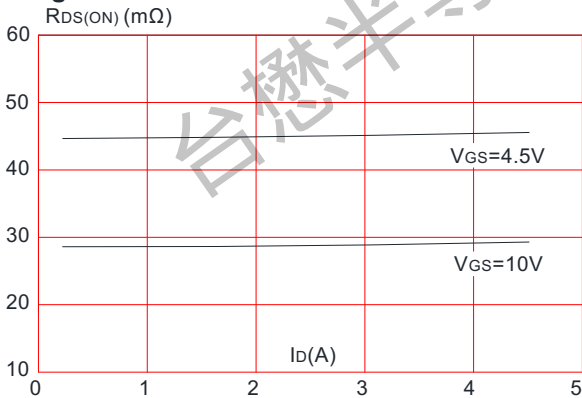


Figure 4: Body Diode Characteristics

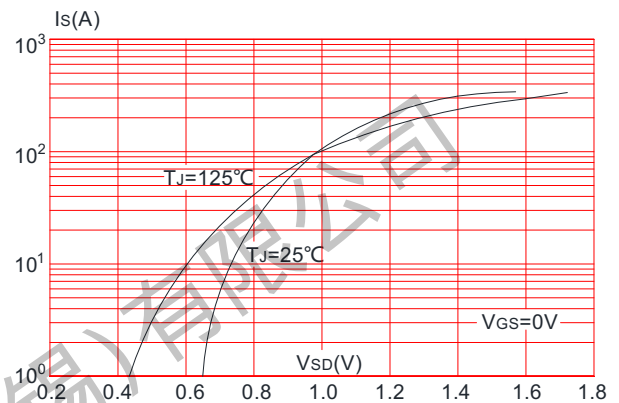


Figure 5: Gate Charge Characteristics

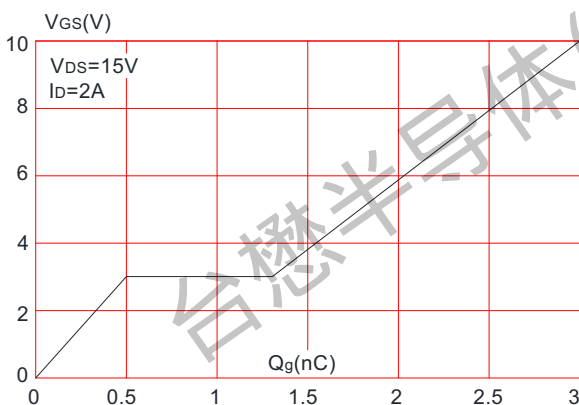
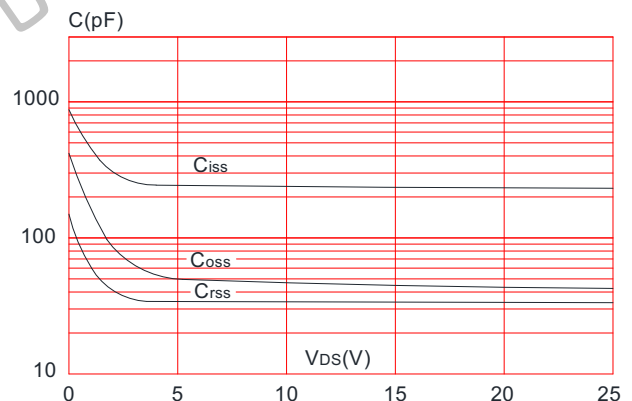


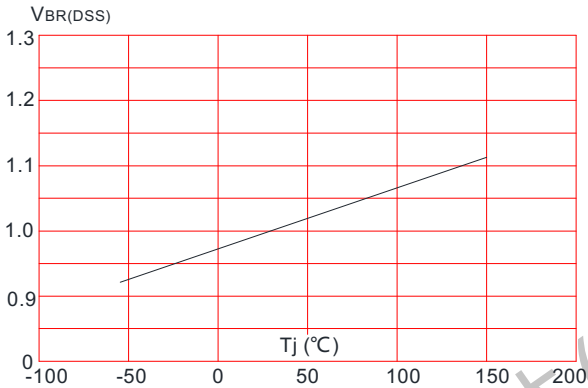
Figure 6: Capacitance Characteristics



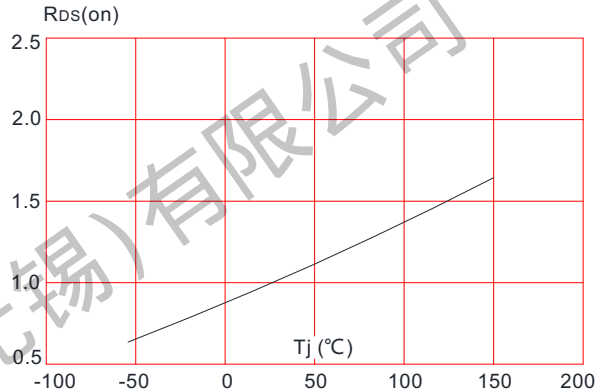
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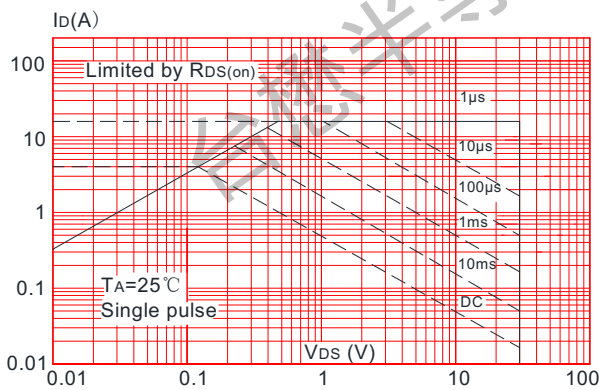
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



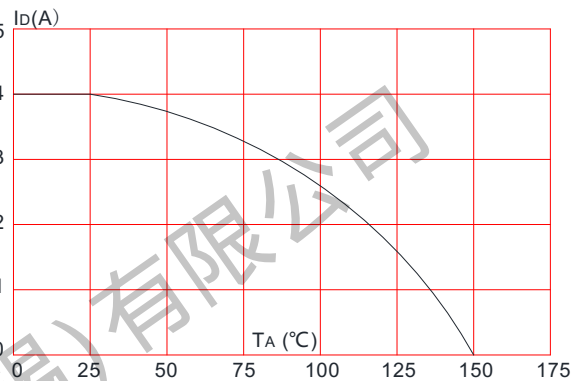
**Figure 8:** Normalized on Resistance vs. Junction Temperature



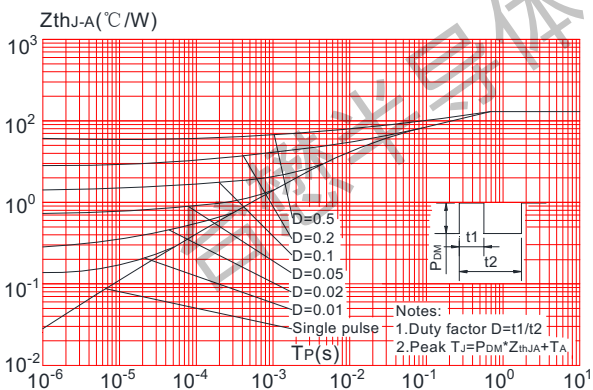
**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature



**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

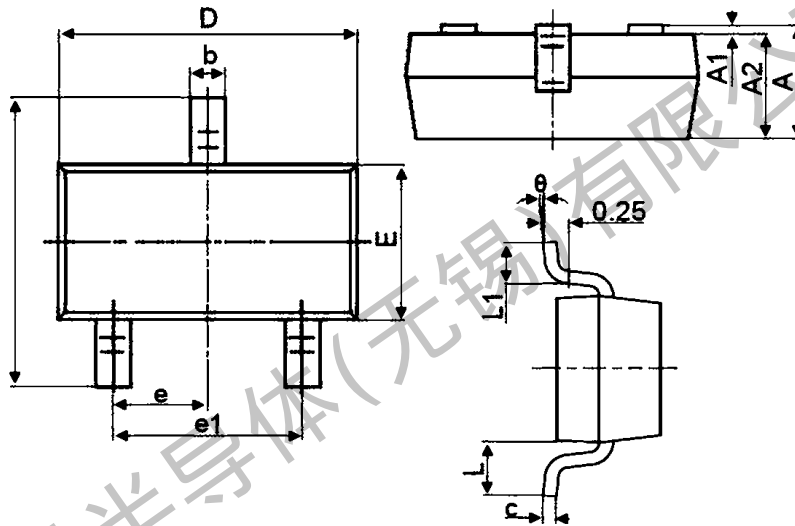




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**Package Mechanical Data:SOT-23**



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
theta	0°	8°

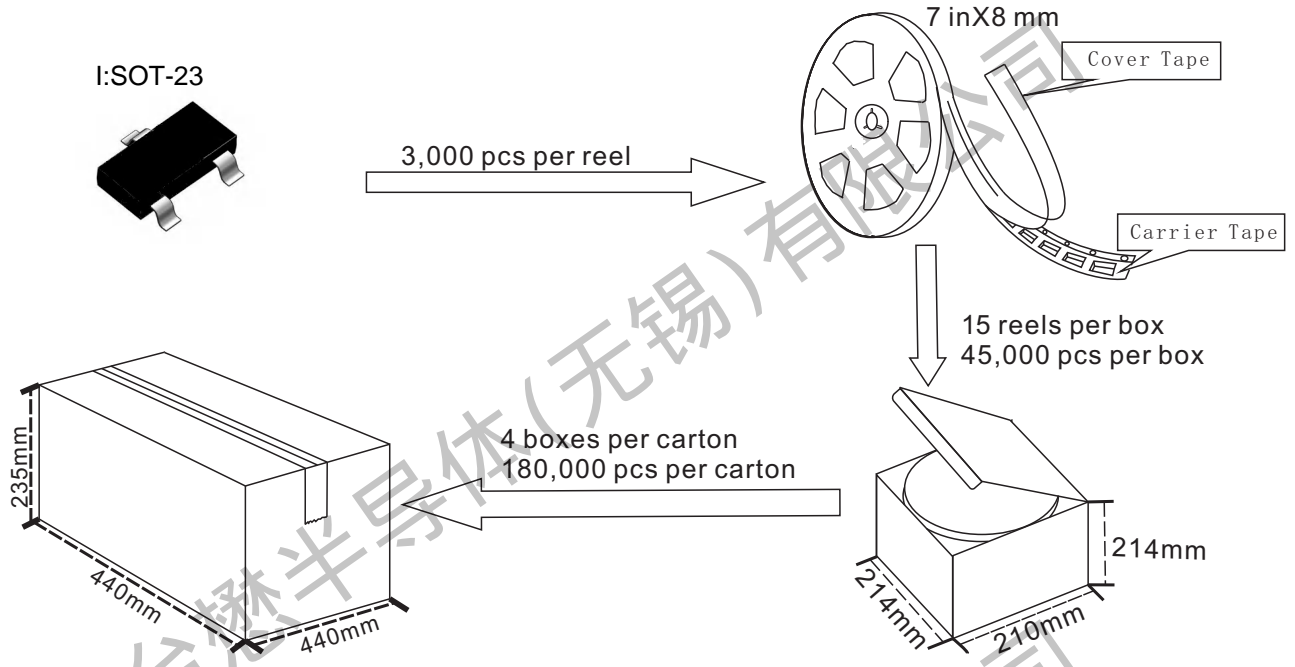


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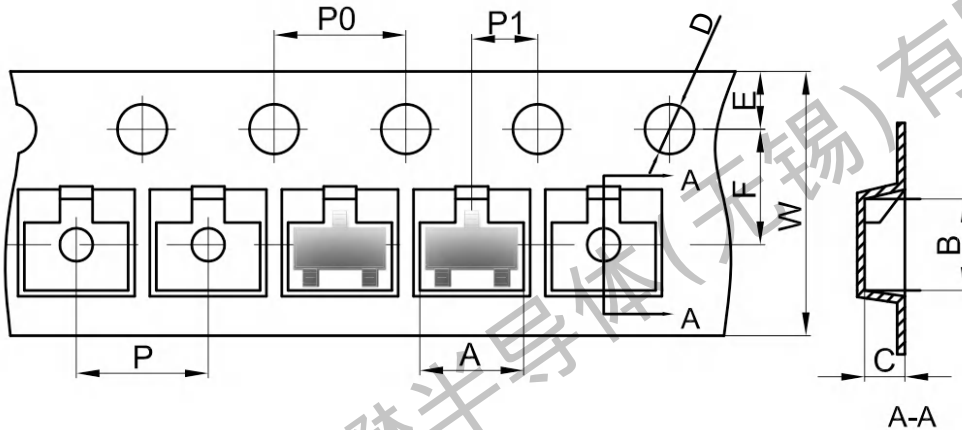
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SOT-23 Packing

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



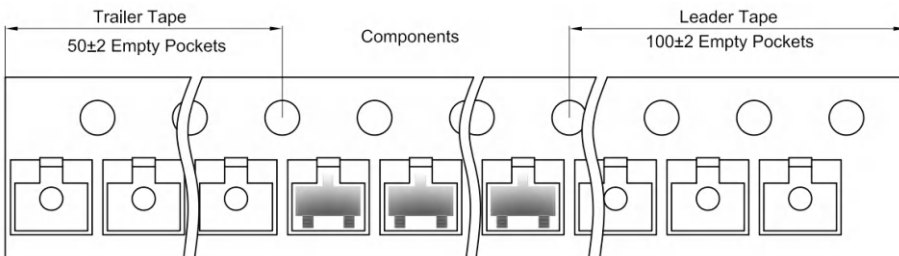
SOT-23 Embossed Carrier Tape



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
2023.05.10	23.05	Original	