


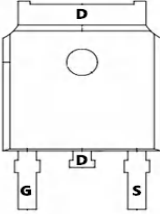
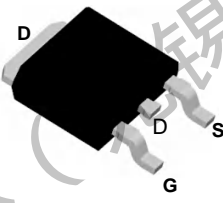
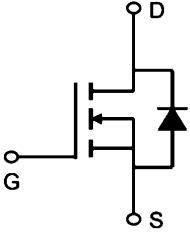


# TM30N04D

# 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} = 40V</math> <math>I_D = 30A</math>  <math>R_{DS(ON)} = 18m\Omega</math> (Typ.) @ <math>V_{GS} = 10V</math></p> <p>100% UIS Tested          100% <math>R_g</math> Tested</p> 
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**D:TO-252-3L**

Marking: 30N04

**Absolute Maximum Ratings** ( $T_C = 25^\circ C$  Unless Otherwise Noted)

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	40	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	30	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	19	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	136	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	17.1	mJ
$I_{AS}$	Avalanche Current	10	A
$P_D @ T_C = 25^\circ C$	Total Power Dissipation <sup>3</sup>	4	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 <sup>1</sup>	---	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	6.6	$^\circ C/W$

# TM30N04D

# N-Channel Enhancement Mosfet

## Channel 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	40	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =40V, 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	1.2	1.6	2.0	V
R <sub>DS(on)</sub>	Static Drain-Source on-Resistance <small>note3</small>	V <sub>GS</sub> =10V, I <sub>D</sub> =8A	-	18	24	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =5A	-	25	35	mΩ
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V, f=1.0MHz	-	633	-	pF
C <sub>oss</sub>	Output Capacitance		-	67	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	58	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =20V, I <sub>D</sub> =8A, V <sub>GS</sub> =10V	-	12	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	3.2	-	nC
Q <sub>gd</sub>	Gate-Drain("Miller") Charge		-	3.1	-	nC
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> = 20V, R <sub>L</sub> =2.5Ω V <sub>GS</sub> =10V, R <sub>REN</sub> =3Ω	-	4	-	ns
t <sub>r</sub>	Turn-on Rise Time		-	3	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time		-	15	-	ns
t <sub>f</sub>	Turn-off Fall Time		-	2	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Maximum Continuous Drain to Source Diode Forward Current		-	-	30	A
I <sub>SM</sub>	Maximum Pulsed Drain to Source Diode Forward Current		-	-	40	A
V <sub>SD</sub>	Drain to Source Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> = 8A	-	-	1.2	V

- Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature  
 2. EAS condition : T<sub>J</sub>=25°C, V<sub>DD</sub>=20V, V<sub>G</sub>=10V, L=0.5mH, R<sub>g</sub>=25Ω, I<sub>AS</sub>=7.2A  
 T<sub>J</sub>=25°C, V<sub>DD</sub>=-20V, V<sub>G</sub>= -10V, L=0.5mH, R<sub>g</sub>=25Ω, I<sub>AS</sub>=-8.4A  
 3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

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N-Channel Enhancement Mosfet

Typical Performance Characteristics

Figure 1: Output Characteristics

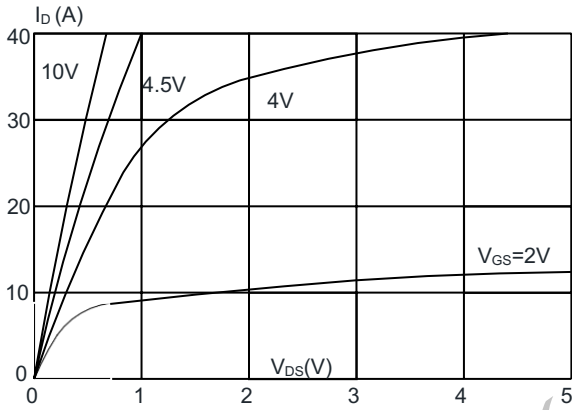


Figure 2: Typical Transfer Characteristics

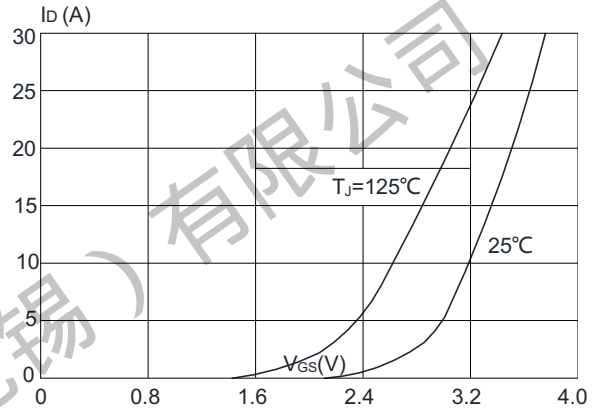


Figure 3: On-resistance vs. Drain Current

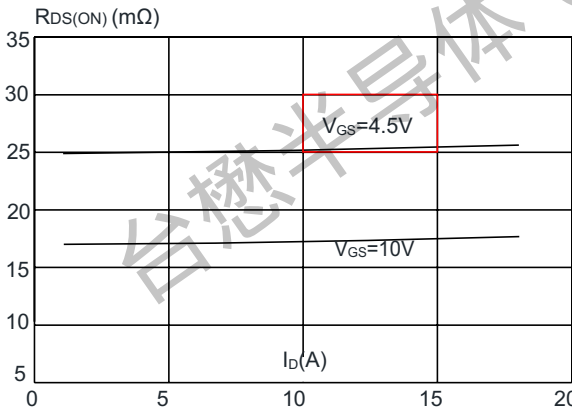


Figure 4: Body Diode Characteristics

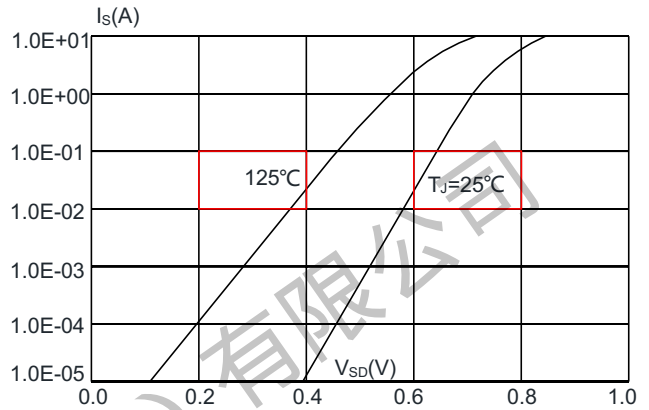


Figure 5: Gate Charge Characteristics

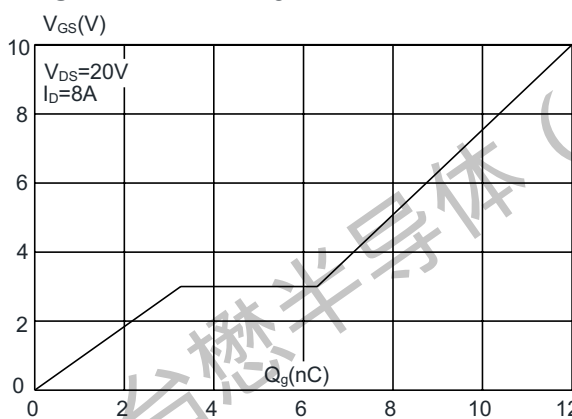
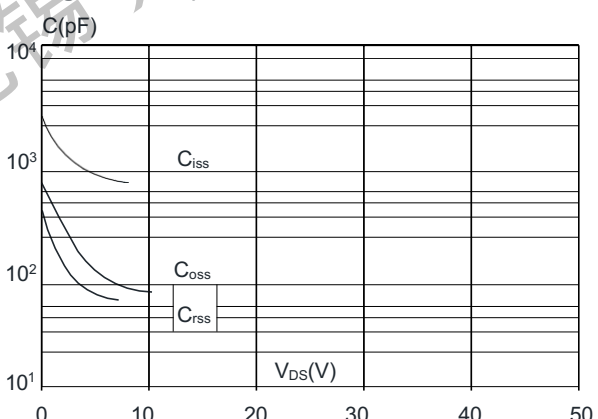


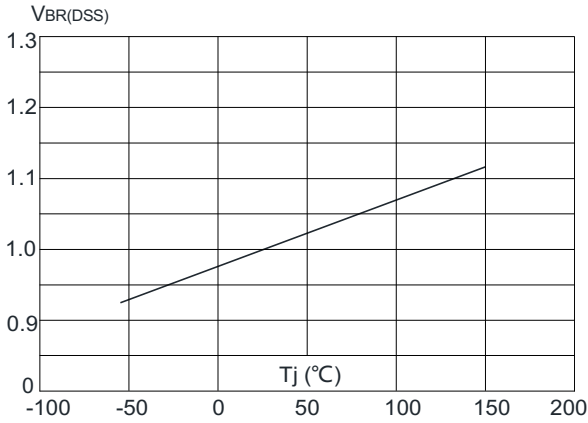
Figure 6: Capacitance Characteristics



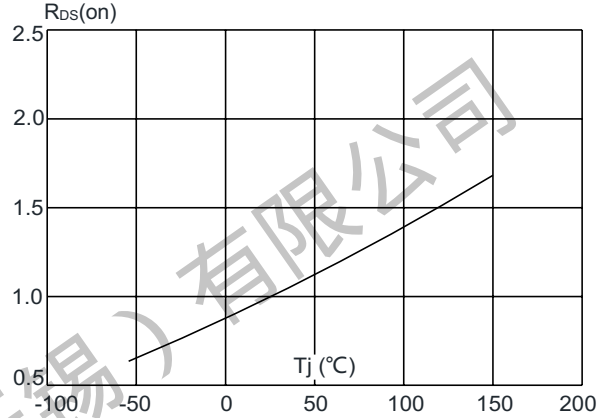
**TM30N04D**

**N-Channel Enhancement Mosfet**

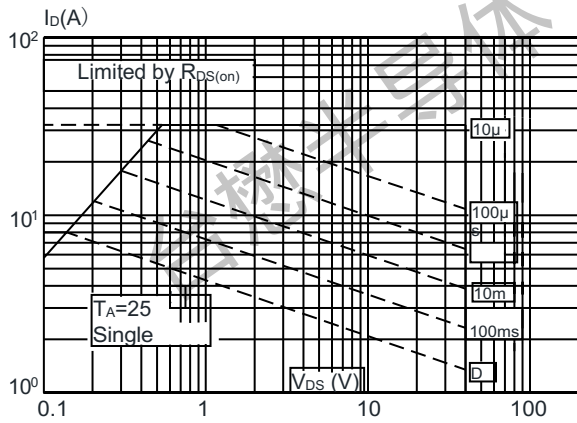
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



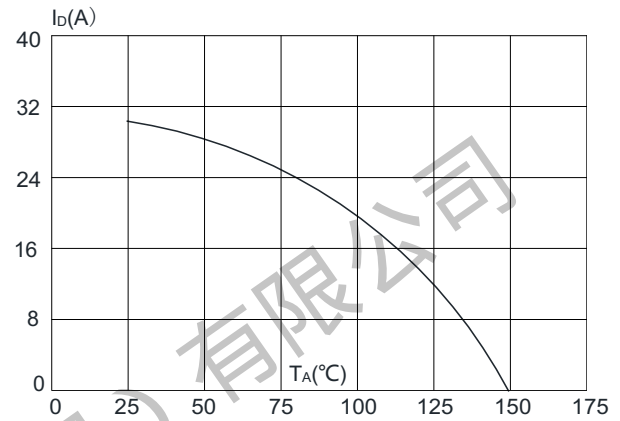
**Figure 8:** Normalized on Resistance vs. Junction Temperature



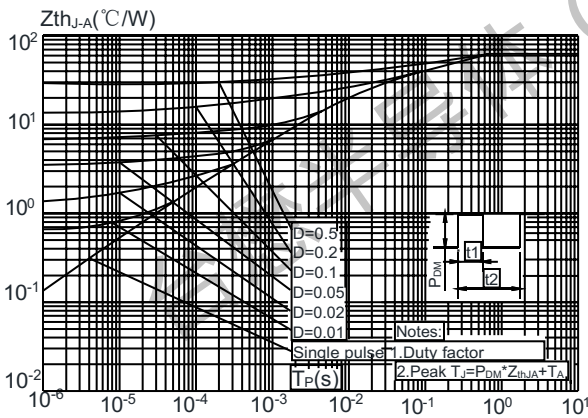
**Figure 9:** Maximum Safe Operating Area



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



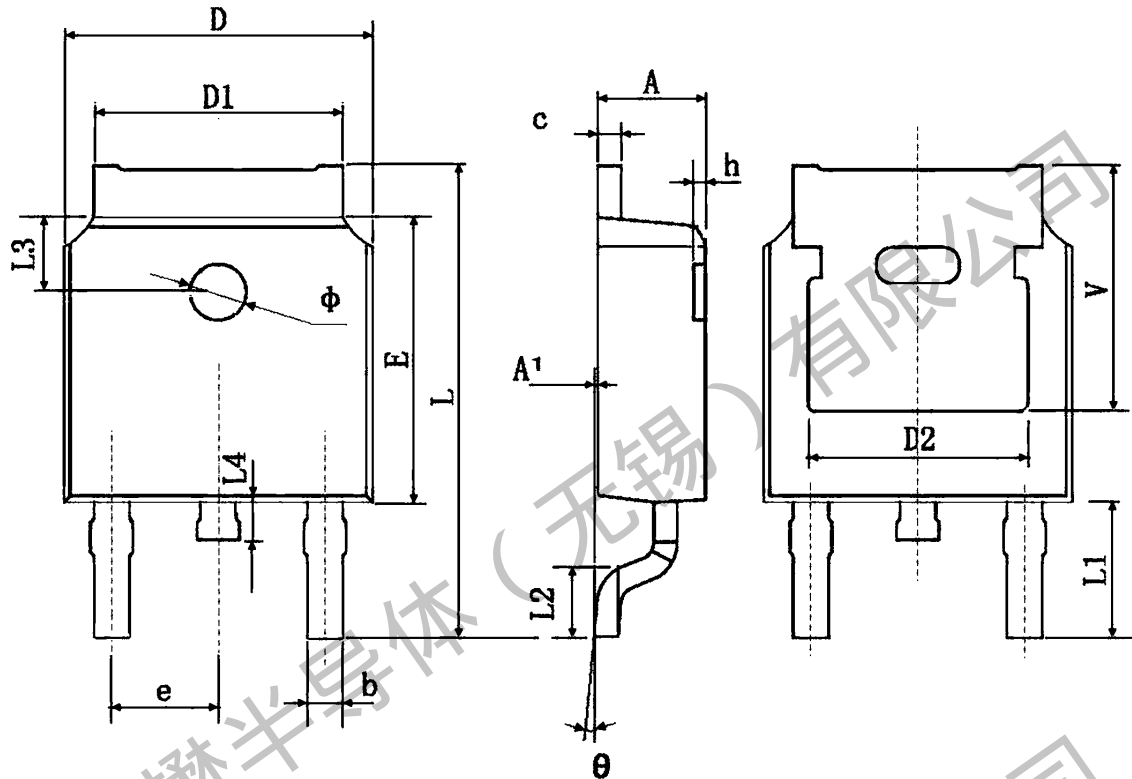
**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



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N-Channel Enhancement Mosfet

Package Mechanical Data: TO-252-3L

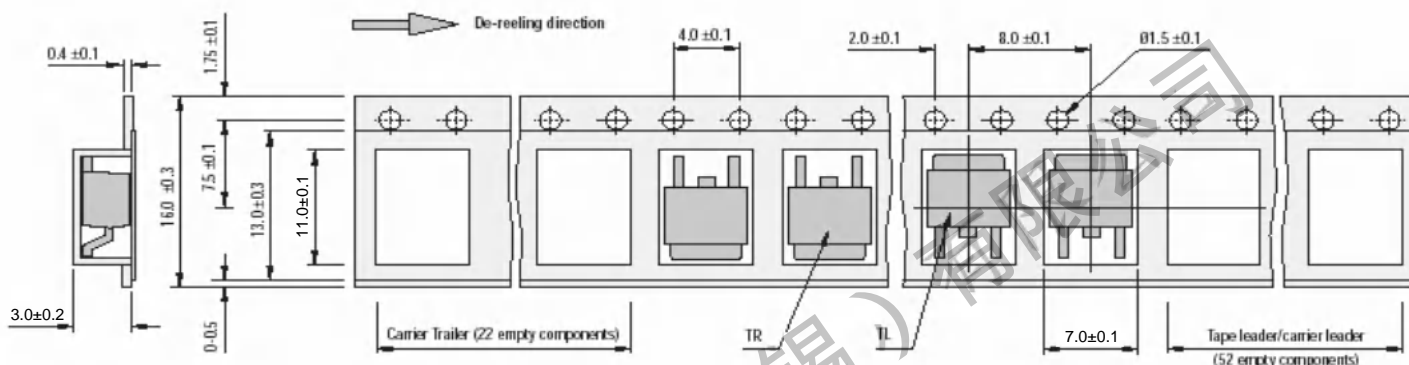


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	

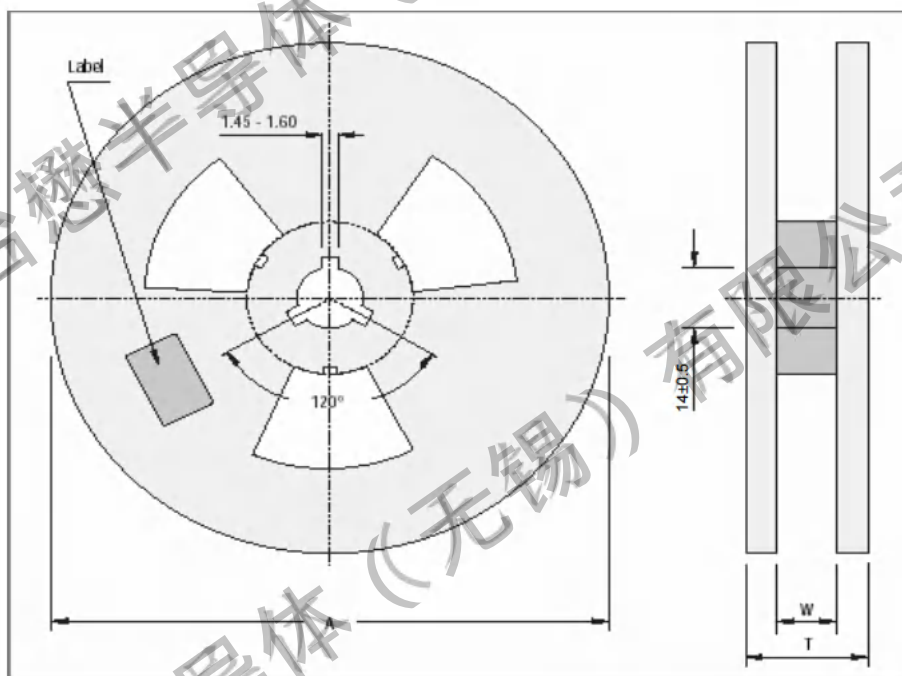
**TM30N04D**

**N-Channel Enhancement Mosfet**

TO-252-3L Embossed Carrier Tape



TO-252-3L Reel



All Dimensions are in mm.

Reel Specifications				
Package	Tape Width	Reel Dia. A - Max	Inside Thickness W	Reel Thickness T - max
TO-252-3L	16	330	18.0 ±1.5	20

**Packaging Information**

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
2,500 pcs	13 inch	5,000 pcs	355×370×50	25,000 pcs	380×275×380	

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Revision history:

Date	Rev	Description	Page
2023.05.09	23.05	Original	