
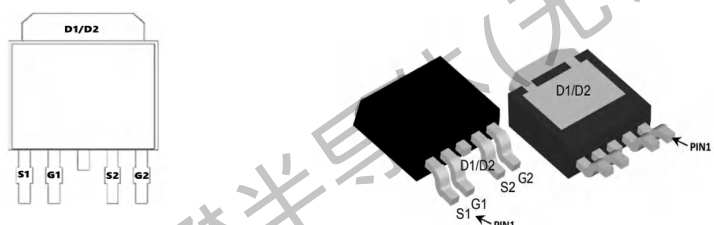
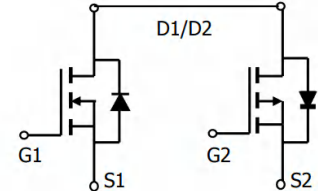


TM30G03GD

N+P-Channel Enhancement Mode 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><b>N Channel</b>  <math>V_{DS} = 30V</math> <math>I_D = 30A</math>  <math>R_{DS(ON)} = 9.0m\Omega</math> (typ.) @ <math>V_{GS} = 10V</math></p> <p><b>P Channel</b>  <math>V_{DS} = -30V</math> <math>I_D = -27A</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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**GD:TO-252-4L**

Marking: 3030

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

Symbol	Parameter	Rating		Units
		N-Channel	P-Channel	
$V_{DS}$	Drain-Source Voltage	30	-30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	$\pm 20$	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	30	-27	A
$I_D @ T_A = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	23	-19	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	111	-92	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	28	66	mJ
$P_D @ T_C = 25^\circ C$	Total Power Dissipation <sup>4</sup>	15	21.3	W
$T_{STG}$	Storage Temperature Range	-55 to 175	-55 to 175	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 175	-55 to 175	$^\circ C$

**Thermal Data**

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	---	32	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	6	$^\circ C/W$

# TM30G03GD

## N+P-Channel Enhancement Mode Mosfet

### N-Channel Electrical Characteristics $T = 25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=30V, V_{GS}=0V,$	-	-	1.0	$\mu A$
$I_{GSS}$	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.2	1.6	2.0	V
$R_{DS(on)}$	Static Drain-Source on-Resistance <small>note3</small>	$V_{GS}=10V, I_D=10A$	-	9.0	13	m $\Omega$
		$V_{GS}=4.5V, I_D=5A$	-	14	20	
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=15V, V_{GS}=0V,$ $f=1.0MHz$	-	633	-	pF
$C_{oss}$	Output Capacitance		-	120	-	pF
$C_{rss}$	Reverse Transfer Capacitance		-	99	-	pF
$Q_g$	Total Gate Charge	$V_{DS}=15V, I_D=10A,$ $V_{GS}=10V$	-	15	-	nC
$Q_{gs}$	Gate-Source Charge		-	4.7	-	nC
$Q_{gd}$	Gate-Drain("Miller") Charge		-	3.6	-	nC
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-on Delay Time	$V_{DS}=30V, I_D=18A,$ $R_{GEN}=3\Omega, V_{GS}=10V$	-	5	-	ns
$t_r$	Turn-on Rise Time		-	8	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	21	-	ns
$t_f$	Turn-off Fall Time		-	7	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum Continuous Drain to Source Diode Forward Current		-	-	30	A
$I_{SM}$	Maximum Pulsed Drain to Source Diode Forward Current		-	-	72	A
$V_{SD}$	Drain to Source Diode Forward Voltage	$V_{GS}=0V, I_S=18A$	-	-	1.2	V
$t_{rr}$	Body Diode Reverse Recovery Time		-	7	-	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=18A, di/dt=100A/\mu s$	-	5.9	-	nC

Note :

- The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$
- The EAS data shows Max. rating . The test condition is  $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=20A$
- The power dissipation is limited by  $150^{\circ}\text{C}$  junction temperature
- The data is theoretically the same as  $I_D$  and  $I_{DM}$  , in real applications , should be limited by total power dissipation.

## TM30G03GD

## N+P-Channel Enhancement Mode Mosfet

### P-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	-30	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = -30V, V <sub>GS</sub> =0V	-	-	-1	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	-1.0	-1.5	-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> = -10A	-	18	27	mΩ
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -5A	-	26	35	
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = -15V, V <sub>GS</sub> =0V, f=1.0MHz	-	1240	-	pF
C <sub>oss</sub>	Output Capacitance		-	151	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	138	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = -15V, I <sub>D</sub> = -6A, V <sub>GS</sub> = -10V	-	24	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	3.7	-	nC
Q <sub>gd</sub>	Gate-Drain("Miller") Charge		-	4.8	-	nC
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> = -15V, I <sub>D</sub> = -10A, V <sub>GS</sub> = -10V, R <sub>GEN</sub> =3Ω	-	11	-	ns
t <sub>r</sub>	Turn-on Rise Time		-	5.5	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time		-	3.5	-	ns
t <sub>f</sub>	Turn-off Fall Time		-	4.6	-	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> = -10A	-	-	-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>=-15V, V<sub>G</sub>=-10V, R<sub>G</sub>=25Ω, L=0.1mH, I<sub>AS</sub>= -27A  
 3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

TM30G03GD

N+P-Channel Enhancement Mode Mosfet

Typical Performance Characteristics-N

Figure1: Output Characteristics

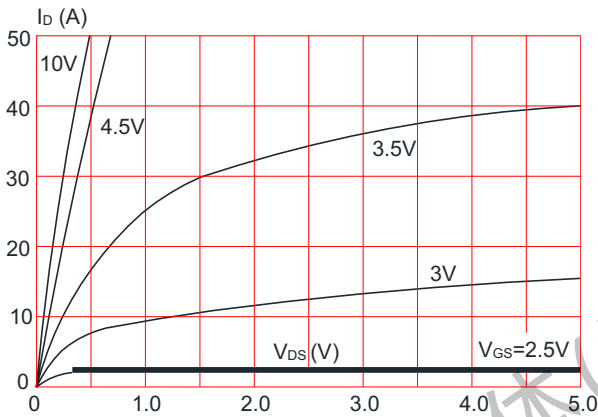


Figure 2: Typical Transfer Characteristics

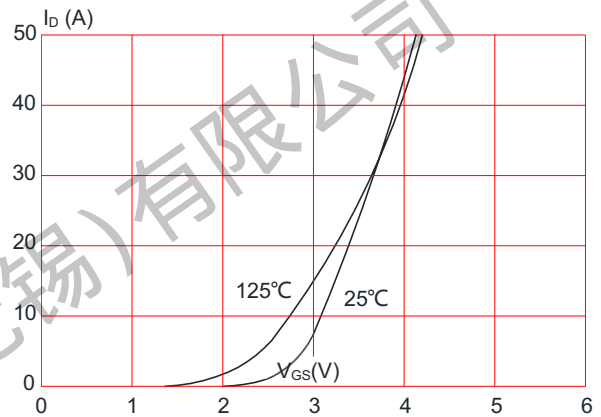


Figure 3: On-resistance vs. Drain Current

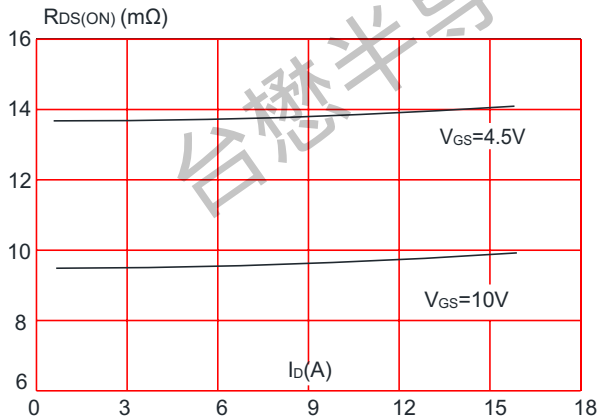


Figure 4: Body Diode Characteristics

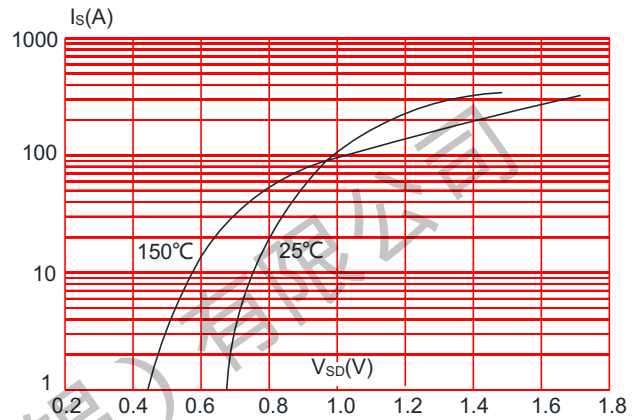


Figure 5: Gate Charge Characteristics

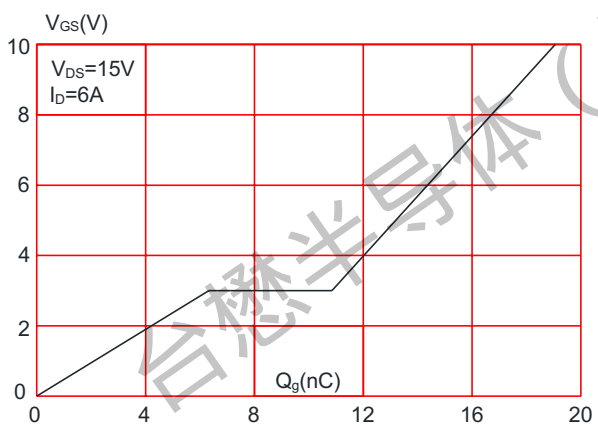
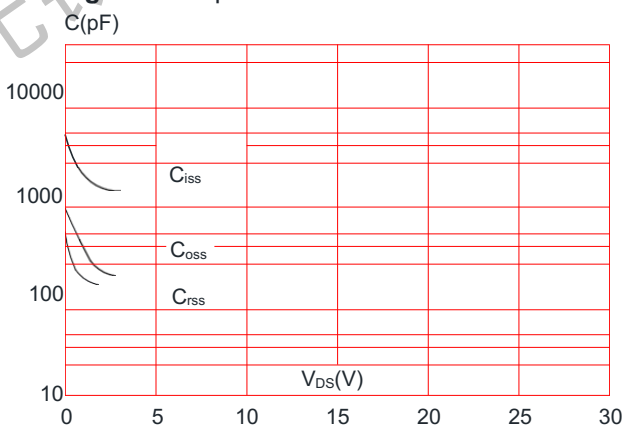


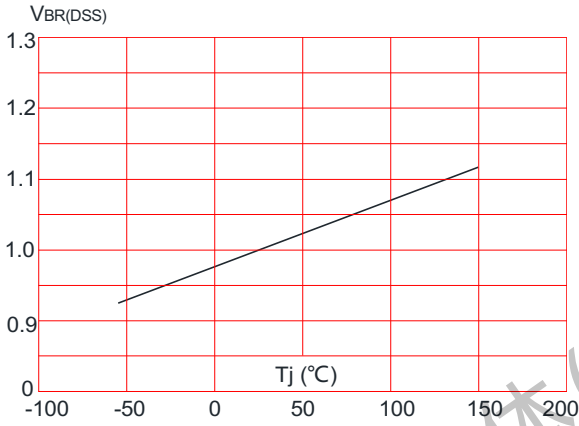
Figure 6: Capacitance Characteristics



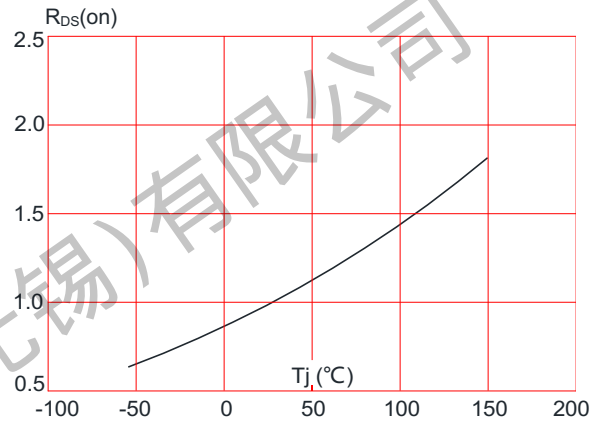
**TM30G03GD**

**N+P-Channel Enhancement Mode Mosfet**

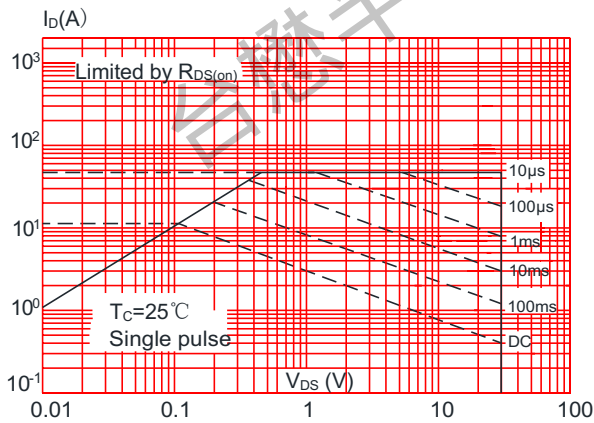
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



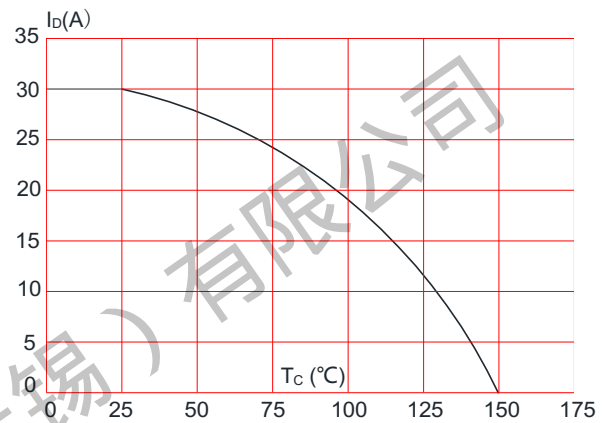
**Figure 8:** Normalized on Resistance vs. Junction Temperature



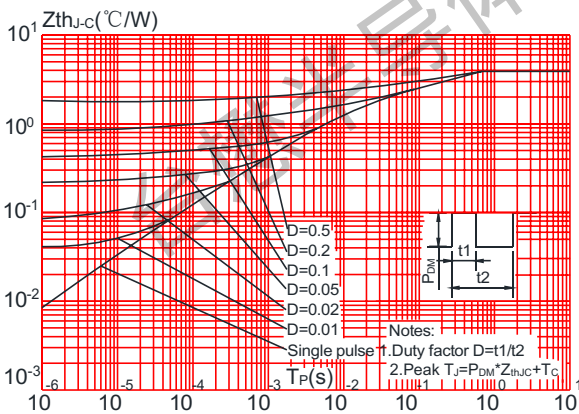
**Figure 9:** Maximum Safe Operating Area



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



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



TM30G03GD

N+P-Channel Enhancement Mode Mosfet

Typical Performance Characteristics-P

Figure 1: Output Characteristics

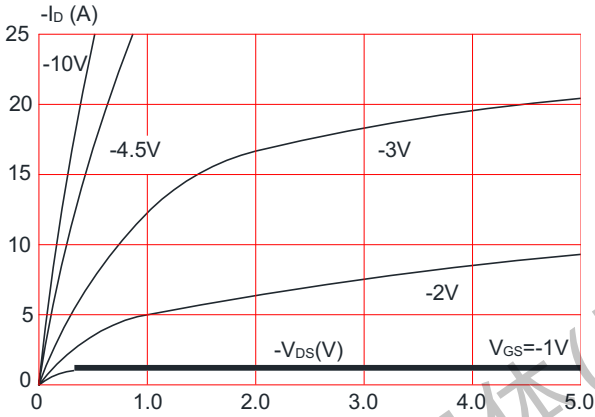


Figure 2: Typical Transfer Characteristics

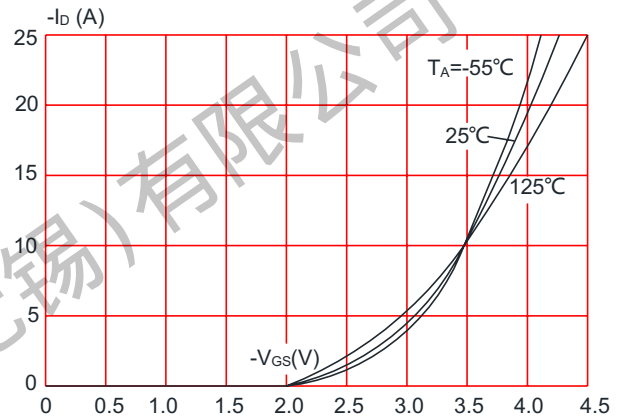


Figure 3: On-resistance vs. Drain Current

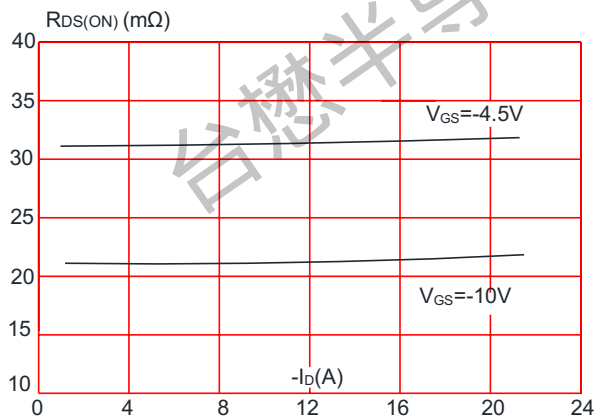


Figure 4: Body Diode Characteristics

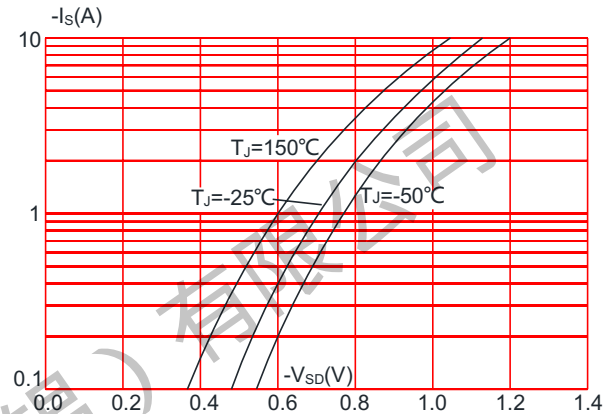


Figure 5: Gate Charge Characteristics

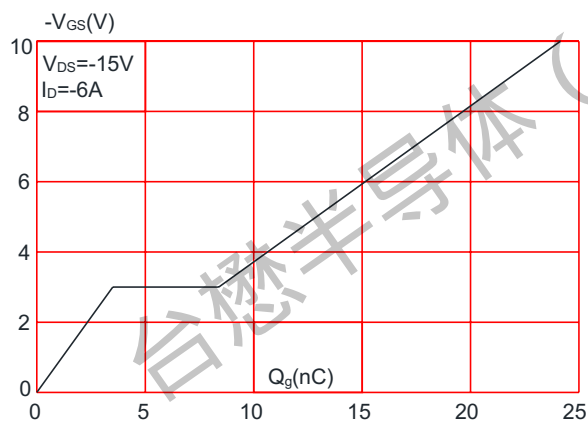
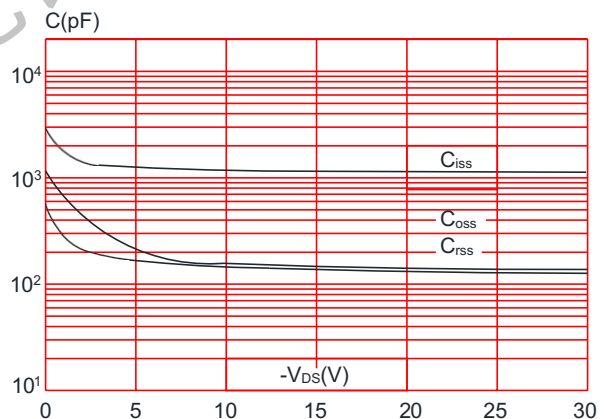


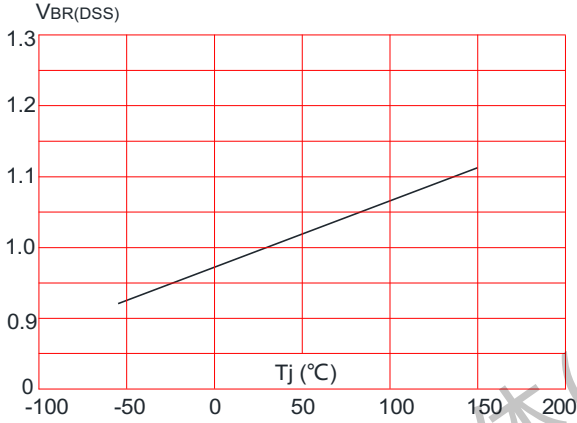
Figure 6: Capacitance Characteristics



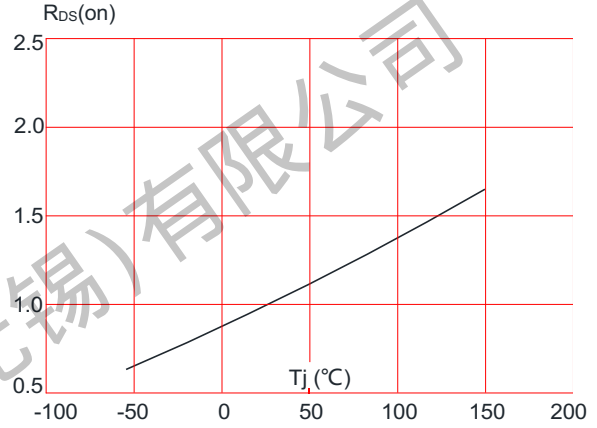
**TM30G03GD**

**N+P-Channel Enhancement Mode Mosfet**

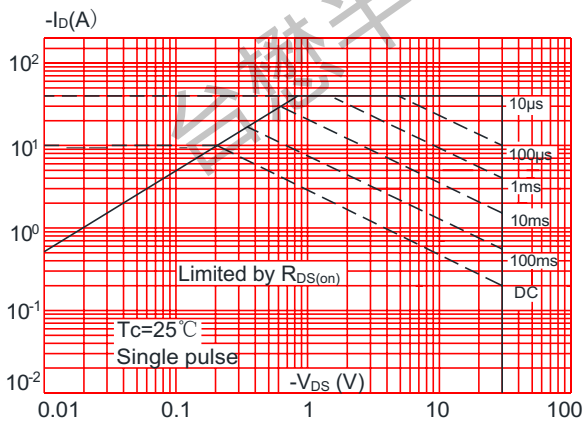
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



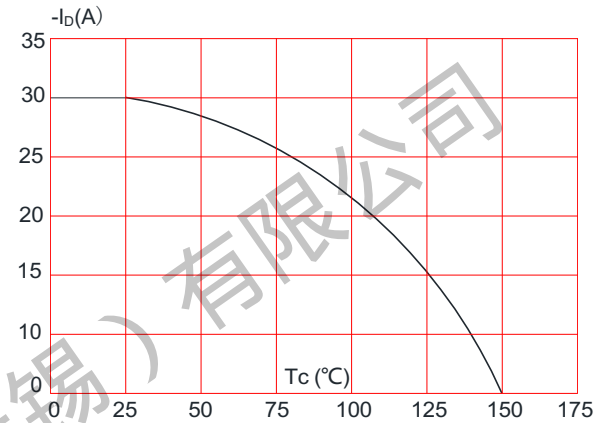
**Figure 8:** Normalized on Resistance vs. Junction Temperature



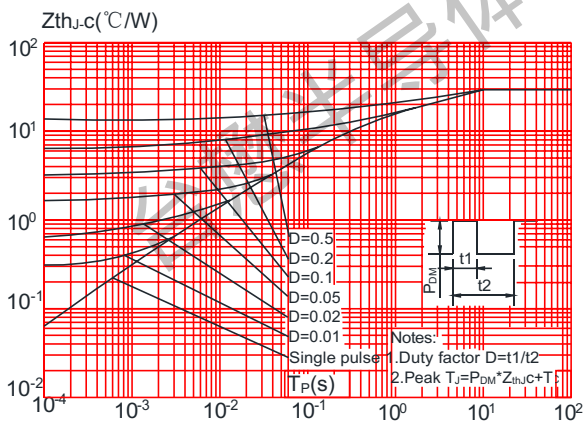
**Figure 9:** Maximum Safe Operating Area



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



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

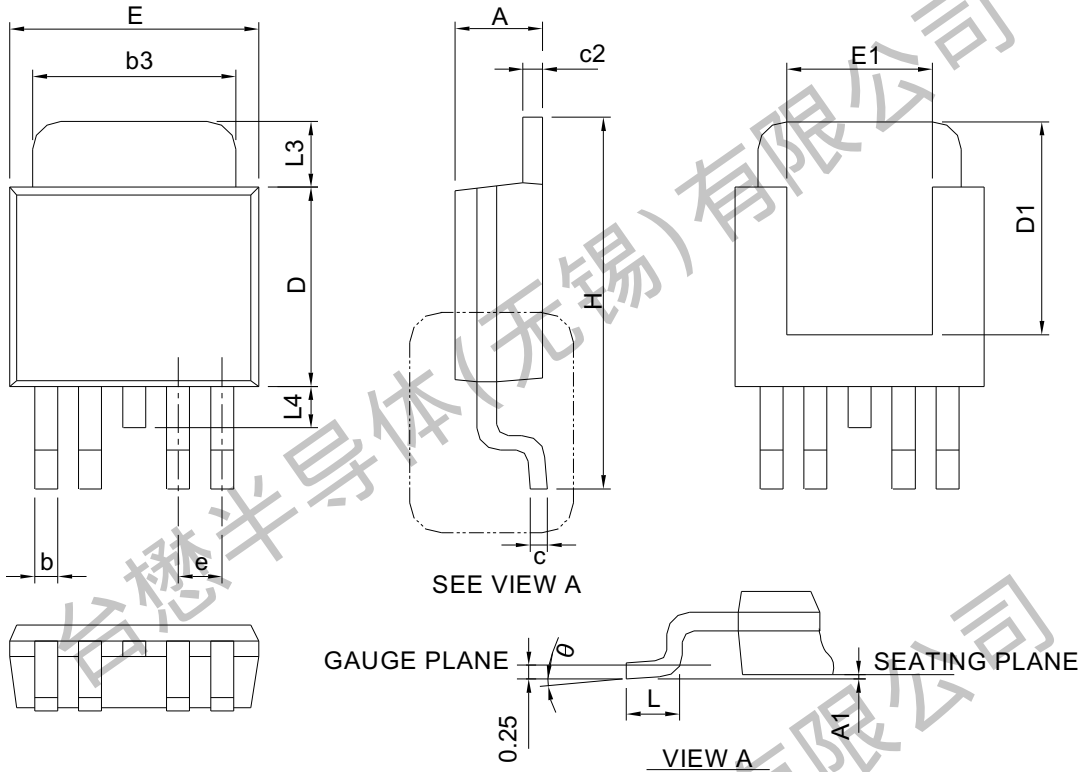




TM30G03GD

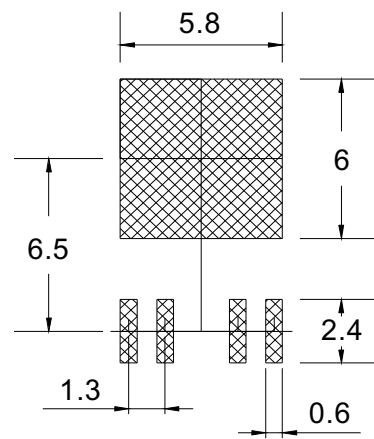
N+P-Channel Enhancement Mode Mosfet

Package Mechanical Data:TO-252-4L



SYMBOL	TO-252-4			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.39	0.086	0.094
A1	-	0.2	-	0.008
b	0.50	0.71	0.020	0.028
b3	4.32	5.46	0.170	0.215
c	0.46	0.61	0.018	0.024
c2	0.46	0.89	0.018	0.035
D	5.33	6.22	0.210	0.245
D1	4.57	6.00	0.180	0.236
E	6.35	6.73	0.250	0.265
E1	3.81	6.00	0.150	0.236
e	1.30 BSC		0.051 BSC	
H	9.40	10.41	0.370	0.410
L	1.40	1.78	0.055	0.070
L3	0.89	2.03	0.035	0.080
L4	-	1.02	-	0.040
θ	0°	8°	0°	8°

RECOMMENDED LAND PATTERN



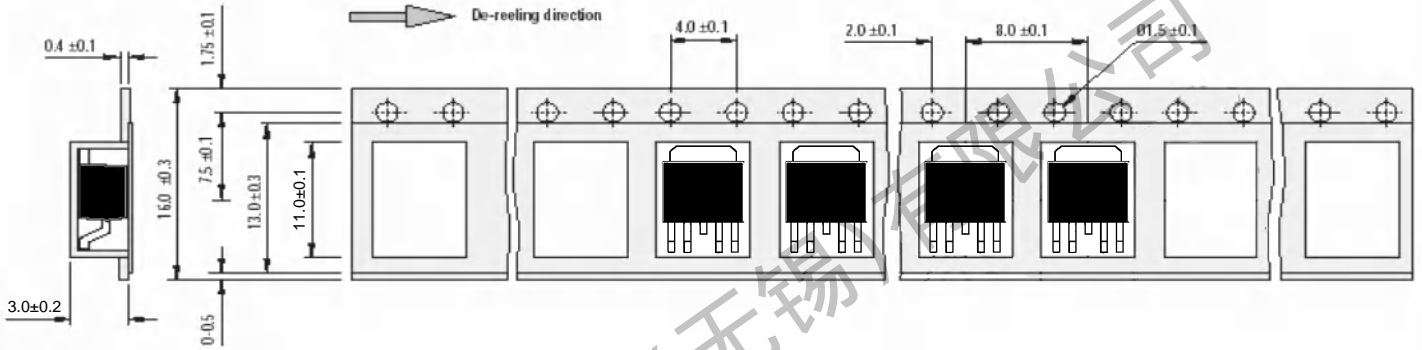
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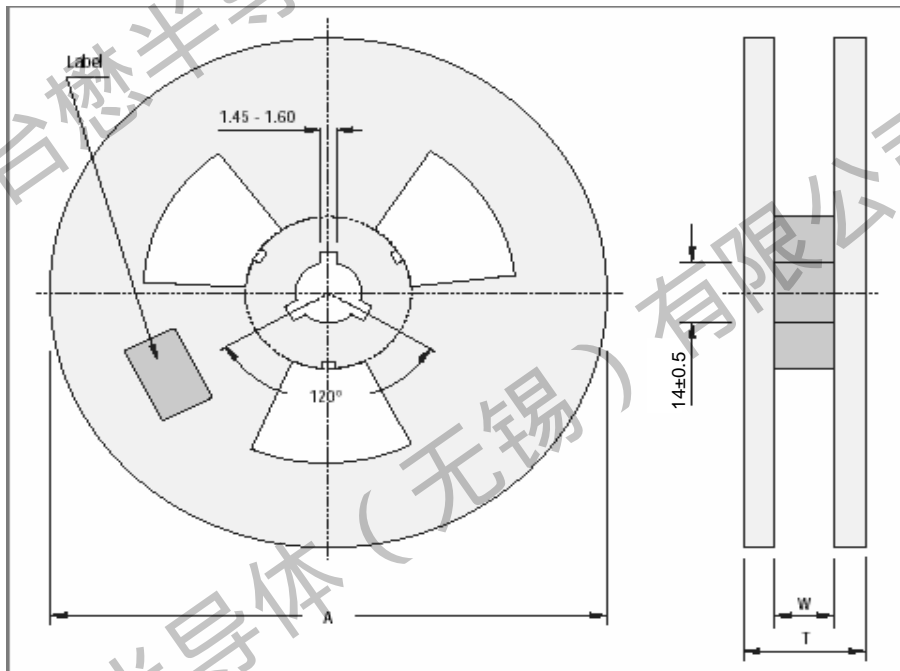
**TM30G03GD**

**N+P-Channel Enhancement Mode Mosfet**

TO-252-4L Embossed Carrier Tape



TO-252-4L Reel



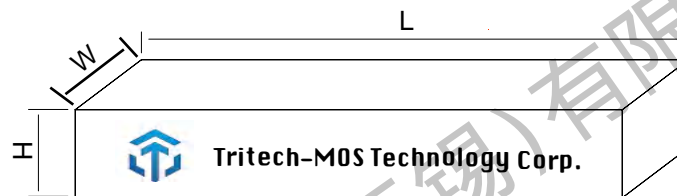
**1.TO-252-4L Packaging**

Package	Packing Form	Quantity		
		Reel	Inner Box	Outbox
TO-252-4L	Reel	2500	5	1

## TM30G03GD

## N+P-Channel Enhancement Mode Mosfet

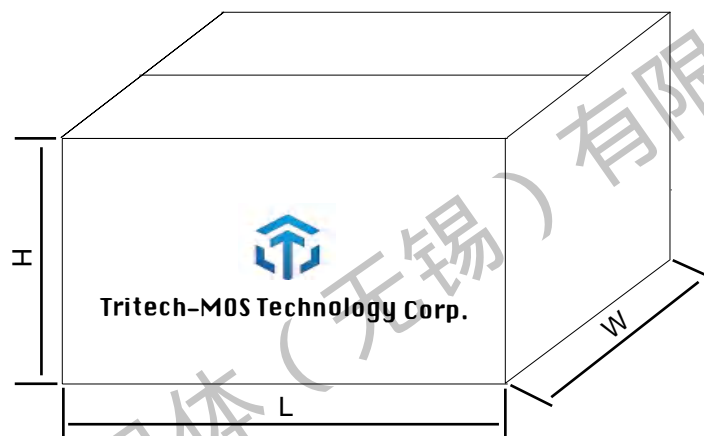
### Inner Box



**Dimension : 370 (L)×355(W) ×50(H) mm**

**Quantity : 2500 × 2Ea = 5000pcs**

### Outer Box



**Dimension : 380(L)×380(W) ×275(H) mm**

**Quantity : 5000 × 5Ea = 25000pcs**

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Revision history:

Date	Rev	Description	Page
2023.08.10	23.08	Original	