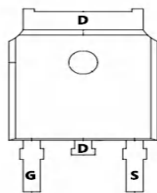
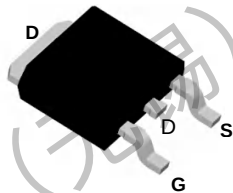
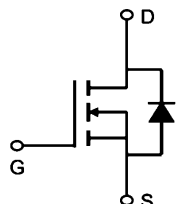




TM60N02D

N-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 = 60A R_{DS(ON)}= 4.8mΩ(typ.) @ V_{GS}=4.5V 100% UIS Tested 100% R_g Tested 																																												
D:TO-252-3L    Marking: 60N02																																													
Absolute Maximum Ratings (T_A = 25°C Unless Otherwise Noted) <table><tr><th>Symbol</th><th>Parameter</th><th>Rating</th><th>Units</th></tr><tr><td>V_{DS}</td><td>Drain-Source Voltage</td><td>20</td><td>V</td></tr><tr><td>V_{GS}</td><td>Gate-Source Voltage</td><td>±12</td><td>V</td></tr><tr><td>I_D@T_C=25°C</td><td>Continuous Drain Current, V_{GS} @ 4.5V</td><td>60</td><td>A</td></tr><tr><td>I_D@T_C=100°C</td><td>Continuous Drain Current, V_{GS} @ 4.5V</td><td>38</td><td>A</td></tr><tr><td>I_{DM}</td><td>Pulsed Drain Current</td><td>220</td><td>A</td></tr><tr><td>EAS</td><td>Single Pulse Avalanche Energy</td><td>48</td><td>mJ</td></tr><tr><td>I_{AS}</td><td>Avalanche Current</td><td>31</td><td>A</td></tr><tr><td>P_D@T_C=25°C</td><td>Total Power Dissipation</td><td>33</td><td>W</td></tr><tr><td>T_{STG}</td><td>Storage Temperature Range</td><td>-55 to 150</td><td>°C</td></tr><tr><td>T_J</td><td>Operating Junction Temperature Range</td><td>-55 to 150</td><td>°C</td></tr></table>		Symbol	Parameter	Rating	Units	V _{DS}	Drain-Source Voltage	20	V	V _{GS}	Gate-Source Voltage	±12	V	I _D @T _C =25°C	Continuous Drain Current, V _{GS} @ 4.5V	60	A	I _D @T _C =100°C	Continuous Drain Current, V _{GS} @ 4.5V	38	A	I _{DM}	Pulsed Drain Current	220	A	EAS	Single Pulse Avalanche Energy	48	mJ	I _{AS}	Avalanche Current	31	A	P _D @T _C =25°C	Total Power Dissipation	33	W	T _{STG}	Storage Temperature Range	-55 to 150	°C	T _J	Operating Junction Temperature Range	-55 to 150	°C
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TM60N02D
N-Channel Enhancement Mosfet
Electrical Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	20	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =20V, V _{GS} =0V,	-	-	1.0	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} =±12V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	0.5	0.7	0.9	V
R _{DS(on)}	Static Drain-Source on-Resistance note3	V _{GS} =4.5V, I _D =25A	-	4.8	5.9	mΩ
		V _{GS} =2.5V, I _D =15A	-	6.8	7.8	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, f=1.0MHz	-	1532	-	pF
C _{oss}	Output Capacitance		-	289	-	pF
C _{rss}	Reverse Transfer Capacitance		-	271	-	pF
Q _g	Total Gate Charge	V _{DS} =10V, I _D =25A, V _{GS} =4.5V	-	23	-	nC
Q _{gs}	Gate-Source Charge		-	4.5	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	7.3	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DS} =10V, I _D =25A, R _{GEN} =3Ω, V _{GS} =4.5V	-	15	-	ns
t _r	Turn-on Rise Time		-	37	-	ns
t _{d(off)}	Turn-off Delay Time		-	52	-	ns
t _f	Turn-off Fall Time		-	21	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	60	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	220	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S =30A	-	-	1.2	V
t _{rr}	Body Diode Reverse Recovery Time	IF=25A, dI/dt=100A/μs	-	25	-	ns
Q _{rr}	Body Diode Reverse Recovery Charge		-	21	-	nC



Typical Performance Characteristics

Figure 1: Output Characteristics

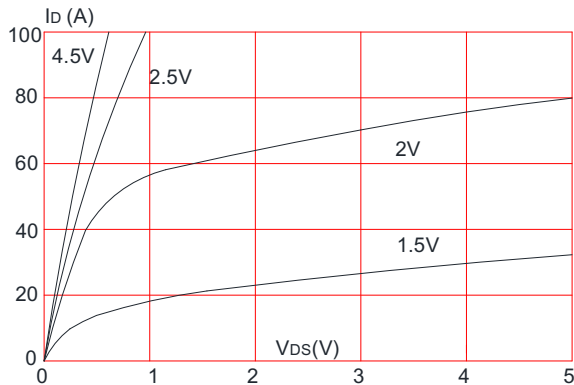


Figure 2: Typical Transfer Characteristics

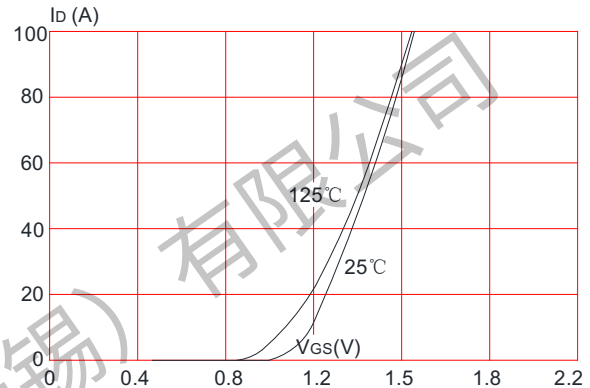


Figure 3: On-resistance vs. Drain Current

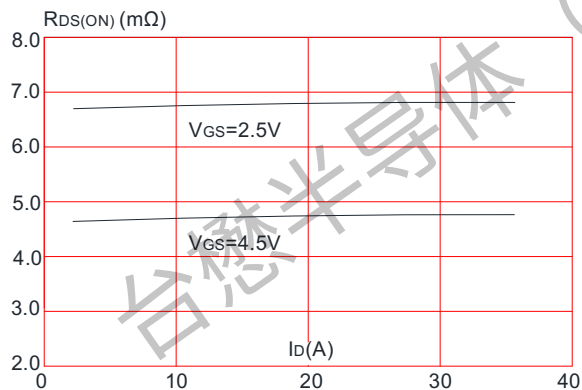


Figure 4: Body Diode Characteristics

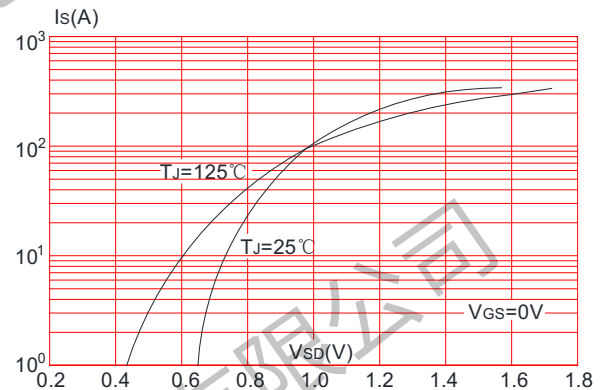


Figure 5: Gate Charge Characteristics

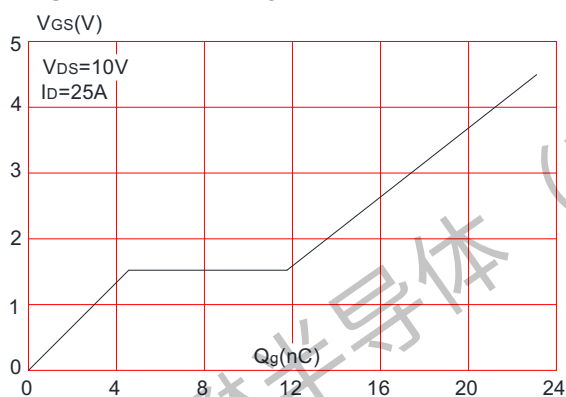
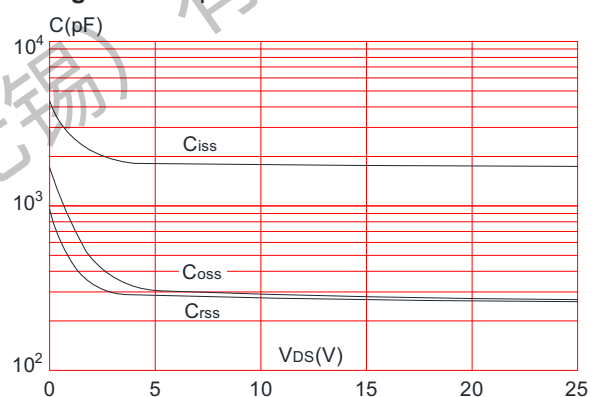


Figure 6: Capacitance Characteristics





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Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

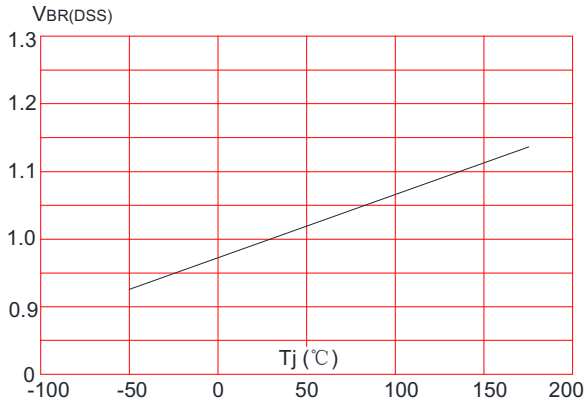


Figure 8: Normalized on Resistance vs. Junction Temperature

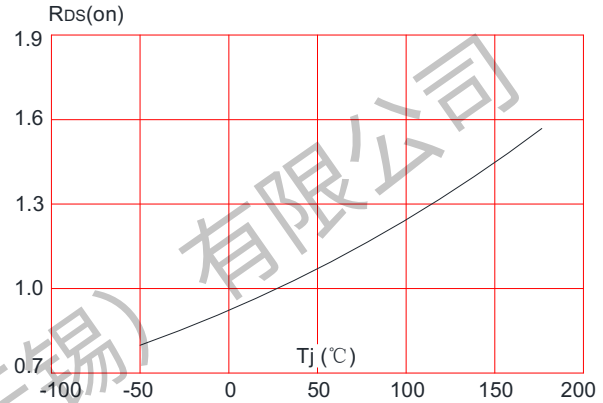


Figure 9: Maximum Safe Operating Area

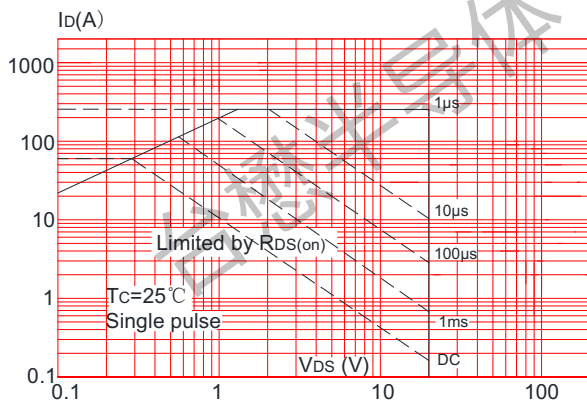


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

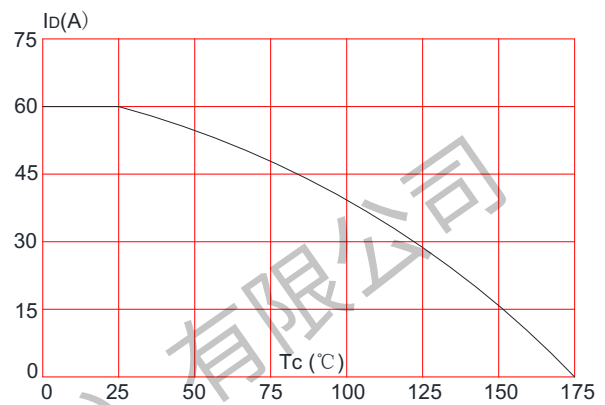
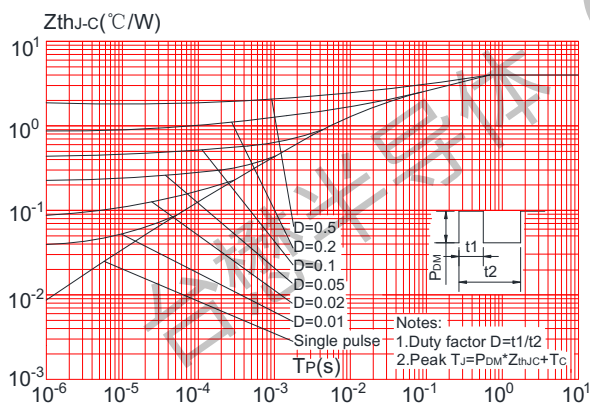


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

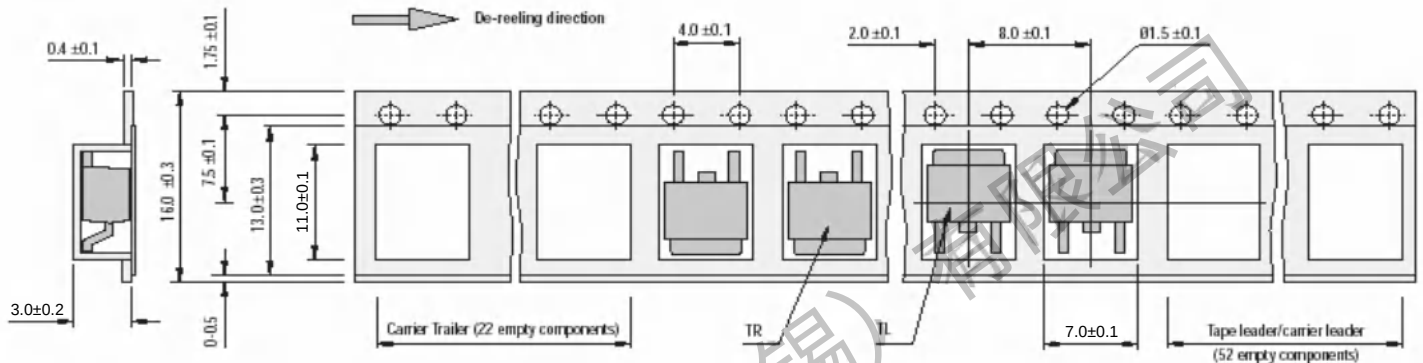




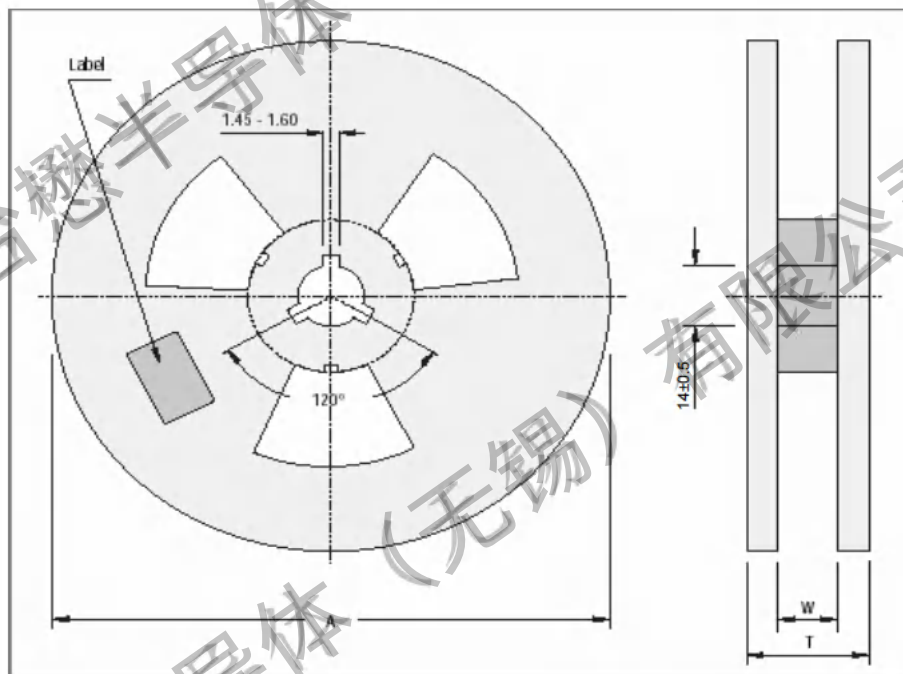
TM60N02D

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
2023.07.09	23.07	Original	