



TM50N02D

N-Channel Enhancement Mosfet

General Description

- Low $R_{DS(ON)}$
- RoHS and Halogen-Free Compliant

Applications

- Load switch
- PWM

General Features

$V_{DS} = 20V$ $I_D = 50A$

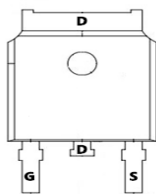
$R_{DS(ON)} = 6.3m\Omega(\text{typ.}) @ V_{GS} = 4.5V$

100% UIS Tested

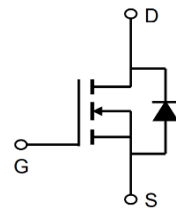
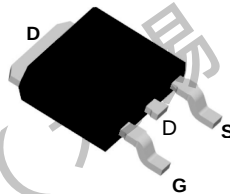
100% R_g Tested



D:TO-252-3L



Marking: 50N02



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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_C = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	50	A
$I_D @ T_C = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^1$	23	A
I_{DM}	Pulsed Drain Current ²	98	A
EAS	Single Pulse Avalanche Energy ³	36	mJ
I_{AS}	Avalanche Current	31	A
$P_D @ T_C = 25^\circ\text{C}$	Total Power Dissipation ³	25	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient ¹	---	62	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	6.6	$^\circ\text{C/W}$



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Electrical Characteristics (T_J=25°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	0.4	0.7	1.1	V
R _{DS(on)}	Static Drain-Source on-Resistance note3	V _{GS} =4.5V, I _D =25A	-	6.3	8.6	mΩ
		V _{GS} =2.5V, I _D =10A	-	8.8	9.8	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, f=1.0MHz	-	1058	-	pF
C _{oss}	Output Capacitance		-	238	-	pF
C _{rss}	Reverse Transfer Capacitance		-	212	-	pF
Q _g	Total Gate Charge	V _{DS} =10V, I _D =25A, V _{GS} =4.5V	-	19	-	nC
Q _{gs}	Gate-Source Charge		-	3	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	6.4	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DS} =10V, I _D =10A, R _{GEN} =3Ω, V _{GS} =4.5V	-	10	-	ns
t _r	Turn-on Rise Time		-	21	-	ns
t _{d(off)}	Turn-off Delay Time		-	39	-	ns
t _f	Turn-off Fall Time		-	19	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	50	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	200	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S =30A	-	-	1.2	V
trr	Body Diode Reverse Recovery Time	IF=20A,dI/dt=100A/μs	-	25	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	20	-	nC

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition: T_J=25°C, V_{DD}=10V, V_G=4.5V, L=0.5mH, R_G=25Ω, I_{AS}=12A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%



Typical Performance Characteristics

Figure 1: Output Characteristics

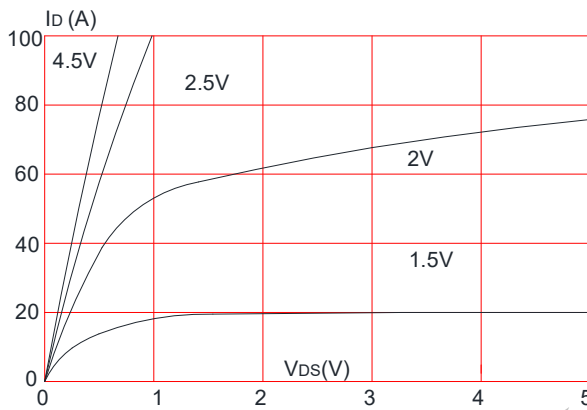


Figure 2: Typical Transfer Characteristics

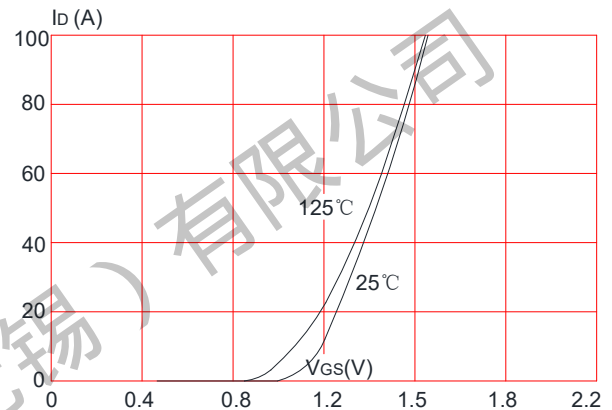


Figure 3: On-resistance vs. Drain Current

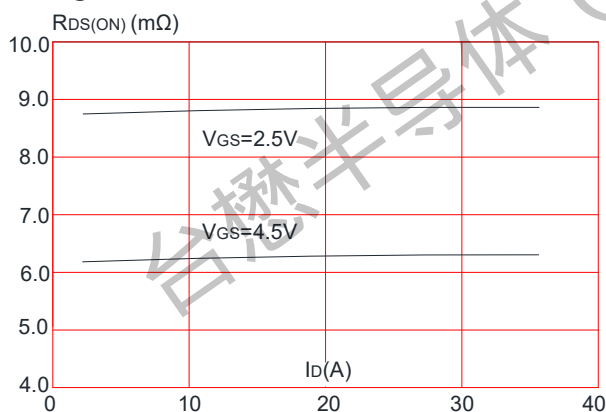


Figure 4: Body Diode Characteristics

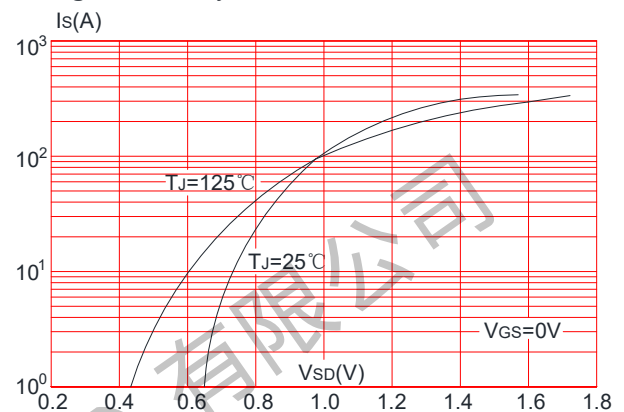


Figure 5: Gate Charge Characteristics

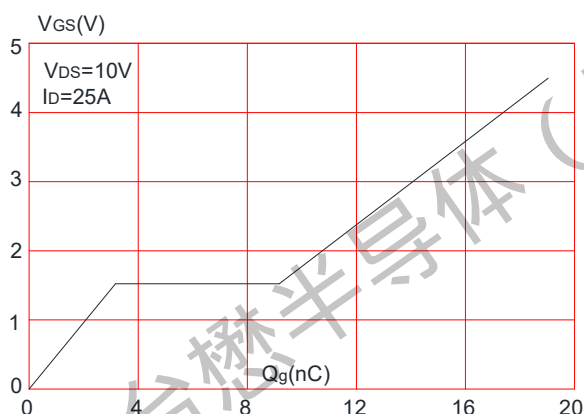
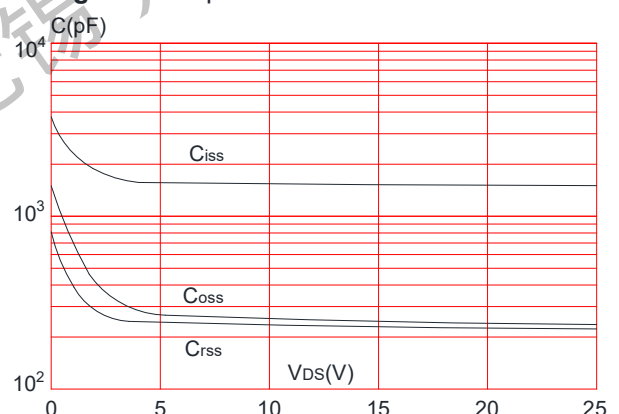


Figure 6: Capacitance Characteristics





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Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

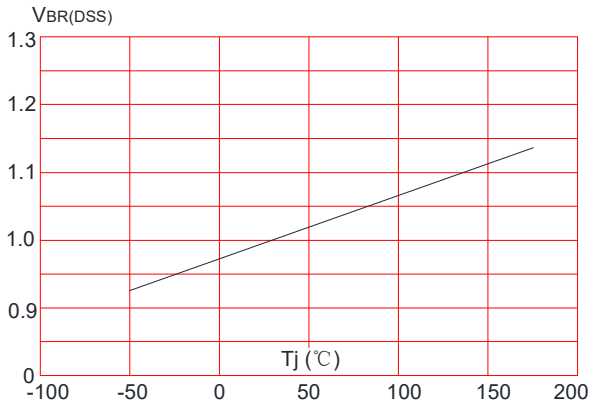


Figure 8: Normalized on Resistance vs. Junction Temperature

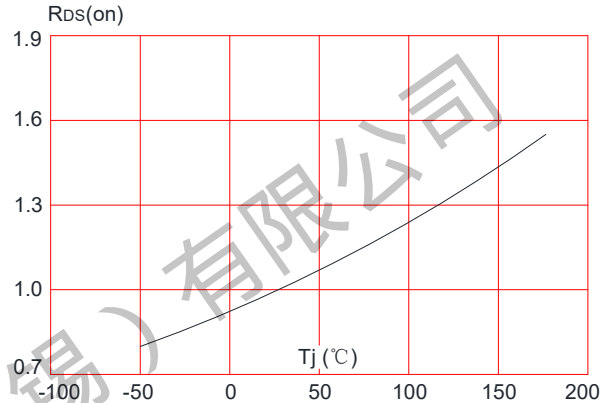


Figure 9: Maximum Safe Operating Area

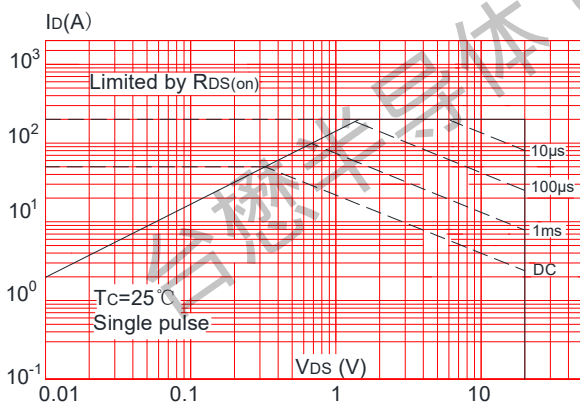


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

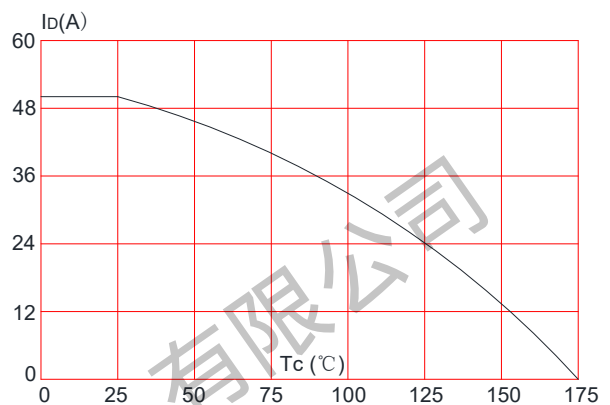
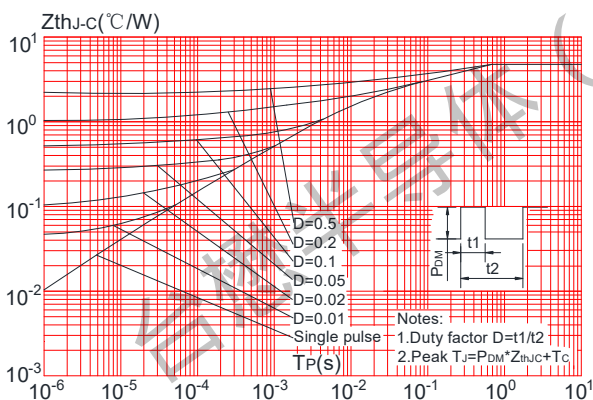


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

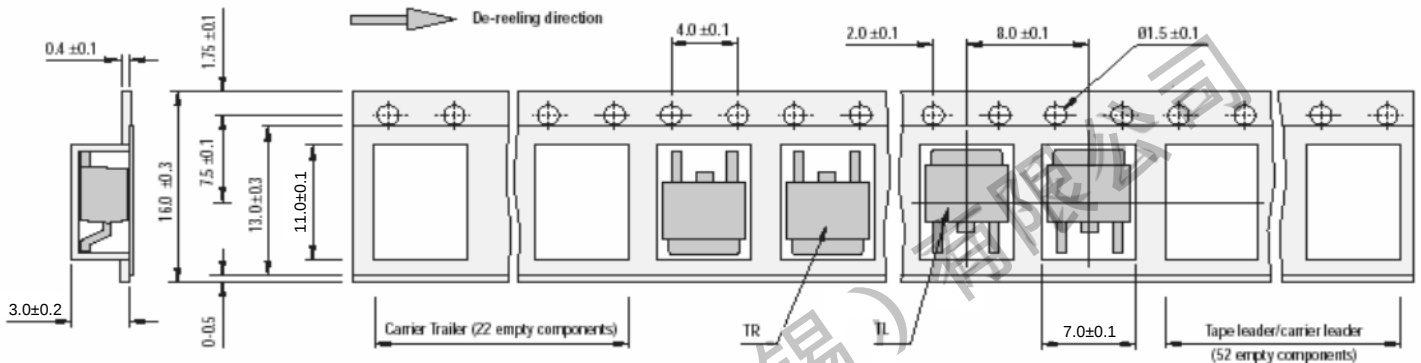




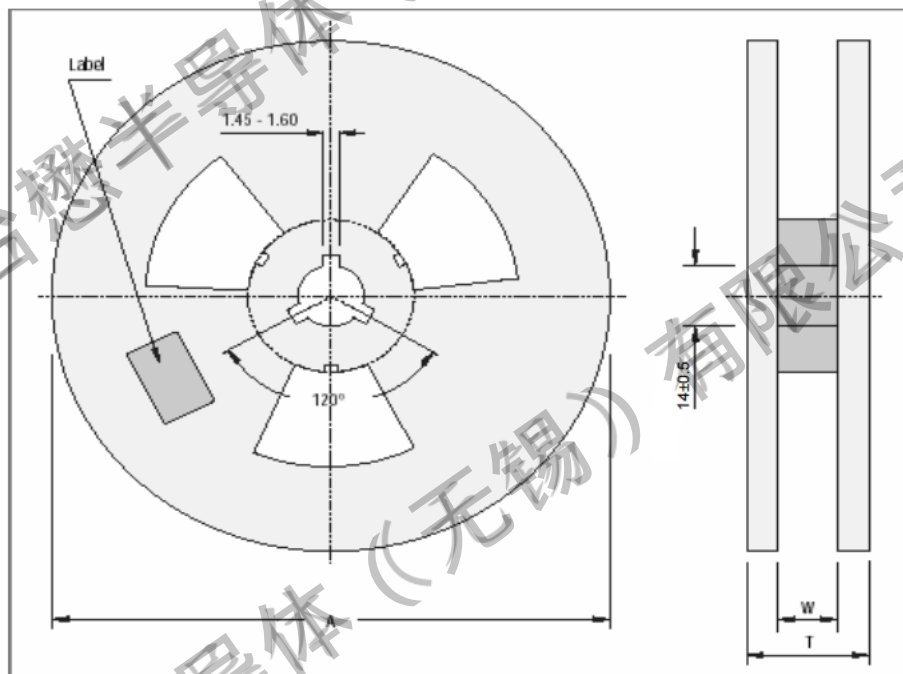
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TO-252-3L Embossed Carrier Tape



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
2023.06.19	23.06	Original	