


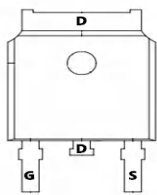


TM20N10D

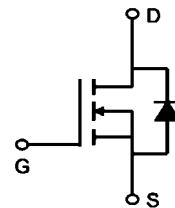
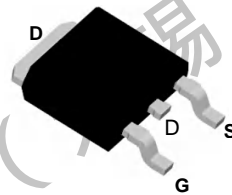
N-Channel Enhancement Mosfet

<p>General Description</p> <ul style="list-style-type: none"> • Low $R_{DS(ON)}$ • RoHS and Halogen-Free Compliant <p>Applications</p> <ul style="list-style-type: none"> • Load switch • PWM 	<p>General Features</p> <p>$V_{DS} = 100V$ $I_D = 20A$</p> <p>$R_{DS(ON)} = 65m\Omega$ (typ.) @ $V_{GS} = 10V$</p> <p>100% UIS Tested 100% R_g Tested</p> 
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D:TO-252-3L



Marking:20N10



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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_c = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	20	A
$I_D @ T_c = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	14	A
I_{DM}	Pulsed Drain Current ²	122	A
EAS	Single Pulse Avalanche Energy ³	4.1	mJ
I_{AS}	Avalanche Current	10	A
$P_D @ T_c = 25^\circ C$	Total Power Dissipation ³	41.7	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$

Thermal Data

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



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Electrical Characteristics (T_J = 25°C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Static Characteristics							
Drain-Source Breakdown Voltage	V_{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	100	-	-	V	
Gate-body Leakage current	I_{GSS}	V _{DS} = 0V, V _{GS} = ±20V	-	-	±100	nA	
Zero Gate Voltage Drain Current	I_{DSS}	V _{DS} = 100V, V _{GS} = 0V	T _J = 25°C	-	-	1	μA
			T _J = 100°C	-	-	100	
Gate-Threshold Voltage	V_{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	1.2	2.0	3.0	V	
Drain-Source on-Resistance ⁴	R_{DS(on)}	V _{GS} = 10V, I _D = 5A	-	65	80	mΩ	
		V _{GS} = 4.5V, I _D = 3A	-	---	---		
Forward Transconductance ⁴	g_{fs}	V _{DS} = 5V, I _D = 5A	-	12	-	S	
Dynamic Characteristics⁵							
Input Capacitance	C_{iss}	V _{DS} = 15V, V _{GS} = 0V, f = 1MHz	-	980	-	pF	
Output Capacitance	C_{oss}		-	53	-		
Reverse Transfer Capacitance	C_{rss}		-	42	-		
Gate Resistance	R_g	f = 1MHz	-	1.3	-	Ω	
Switching Characteristics⁵							
Total Gate Charge	Q_g	V _{GS} = 10V, V _{DS} = 50V, I _D = 5A	-	20.6	-	nC	
Gate-Source Charge	Q_{gs}		-	4	-		
Gate-Drain Charge	Q_{gd}		-	3.7	-		
Turn-On Delay Time	t_{d(on)}	V _{GS} = 10V, V _{DD} = 50V, R _G = 3Ω, I _D = 5A	-	4.7	-	ns	
Rise Time	t_r		-	21	-		
Turn-Off Delay Time	t_{d(off)}		-	20	-		
Fall Time	t_f		-	16	-		
Drain-Source Body Diode Characteristics							
Diode Forward Voltage ⁴	V_{SD}	I _S = 1A, V _{GS} = 0V	-	-	1.2	V	
Continuous Source Current	I_S	T _C = 25°C	-	-	20	A	

Notes:

1. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)} = 150°C.
2. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
3. The EAS data shows Max. rating. The test condition is V_{DD} = 25V, V_{GS} = 10V, L = 0.1mH, I_{AS} = 8A
4. The power dissipation is limited by 150°C junction temperature
5. The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.



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Typical Characteristics

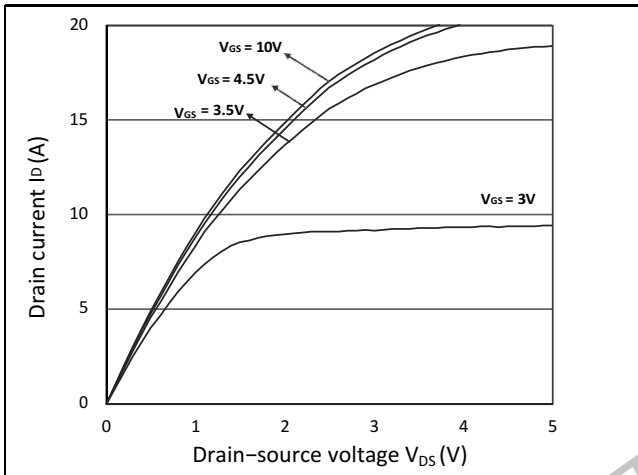


Figure 1. Output Characteristics

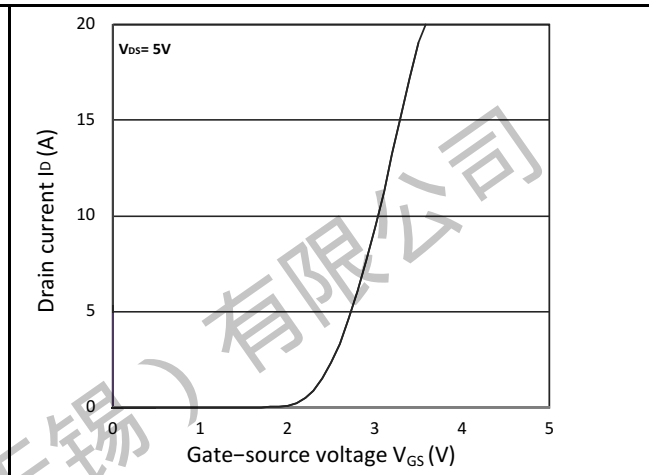


Figure 2. Transfer Characteristics

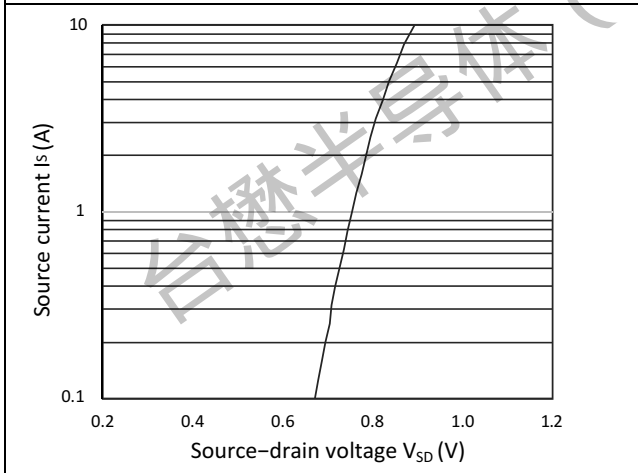


Figure 3. Forward Characteristics of Reverse

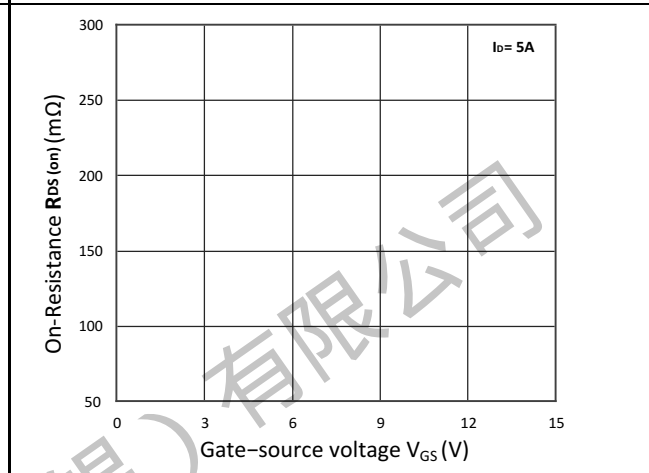


Figure 4. $R_{DS(on)}$ vs. V_{GS}

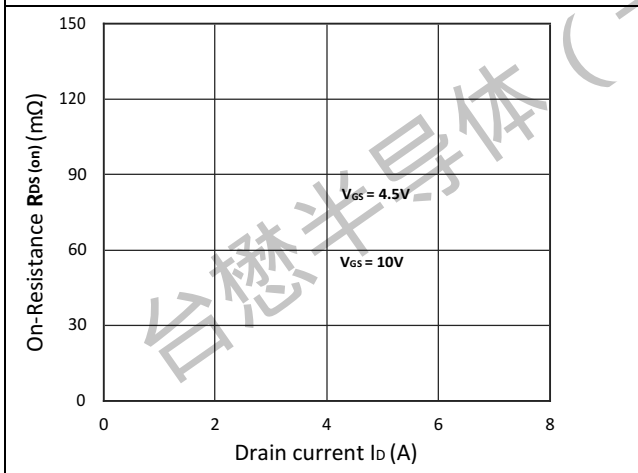


Figure 5. $R_{DS(on)}$ vs. I_D

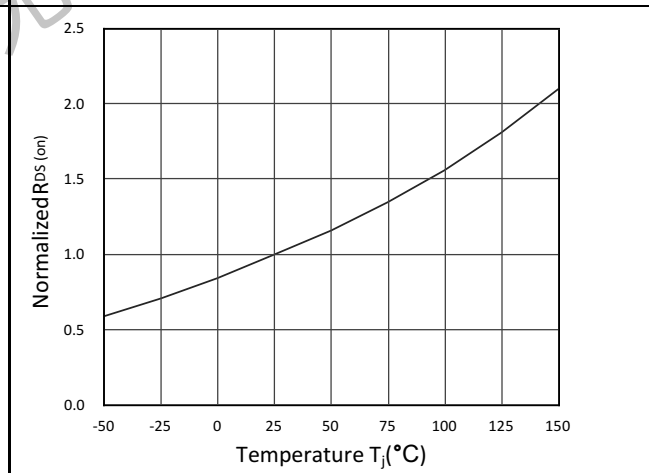


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature



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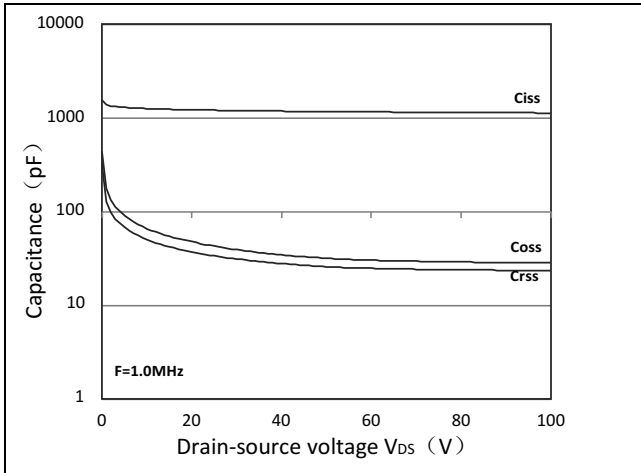


Figure 7. Capacitance Characteristics

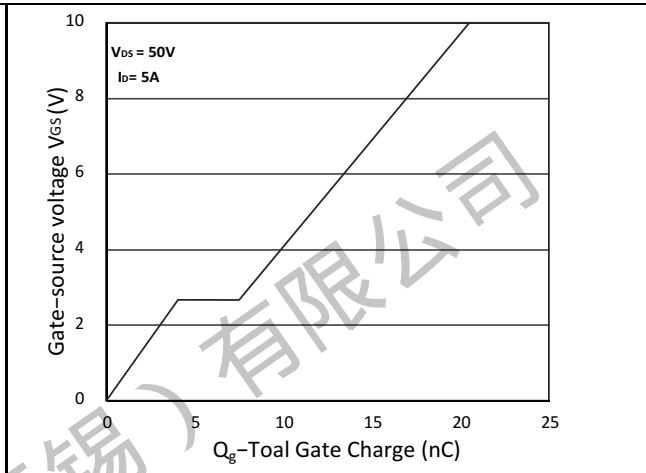


Figure 8. Gate Charge Characteristics

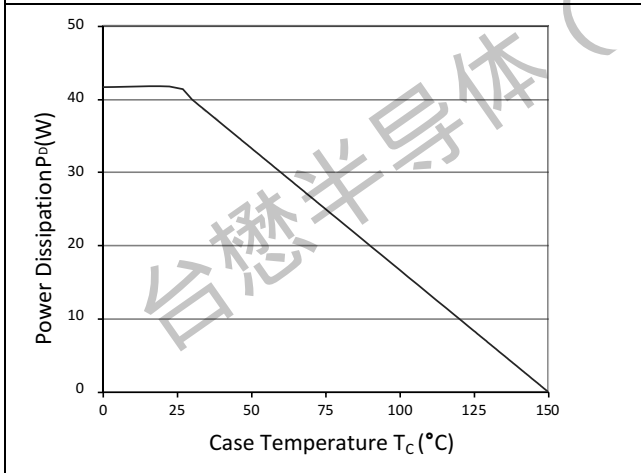


Figure 9. Power Dissipation

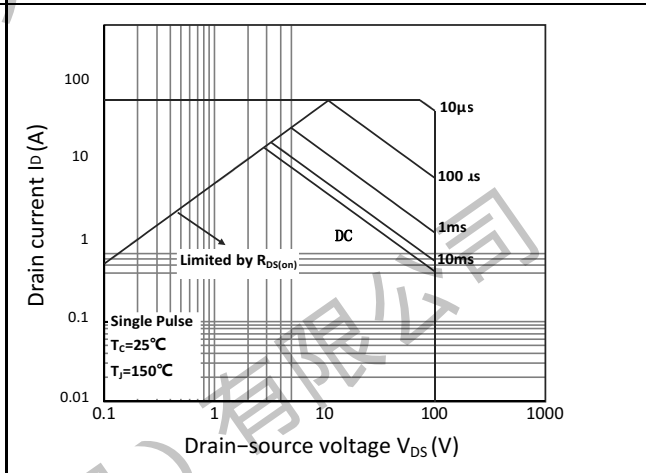


Figure 10. Safe Operating Area

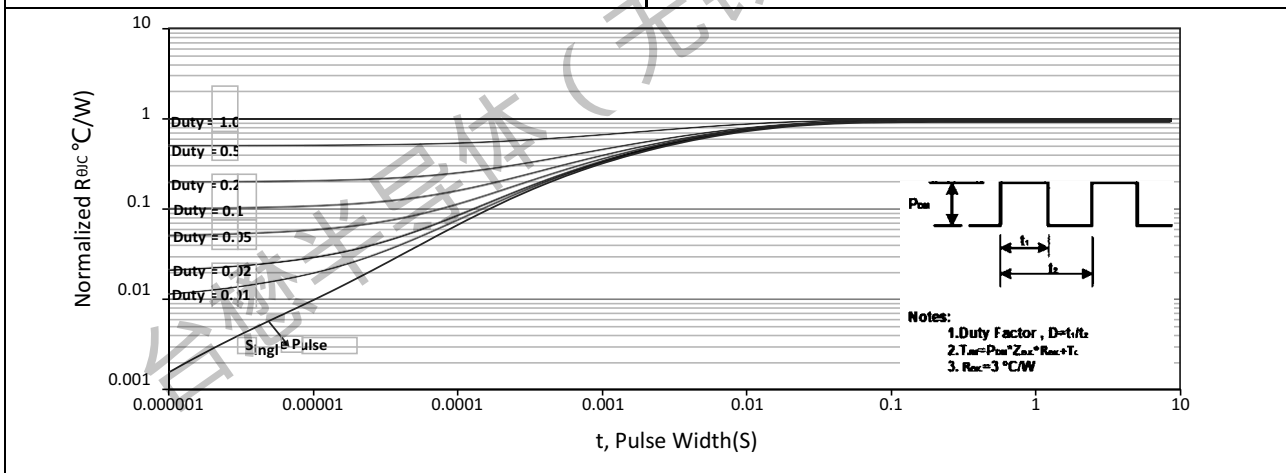
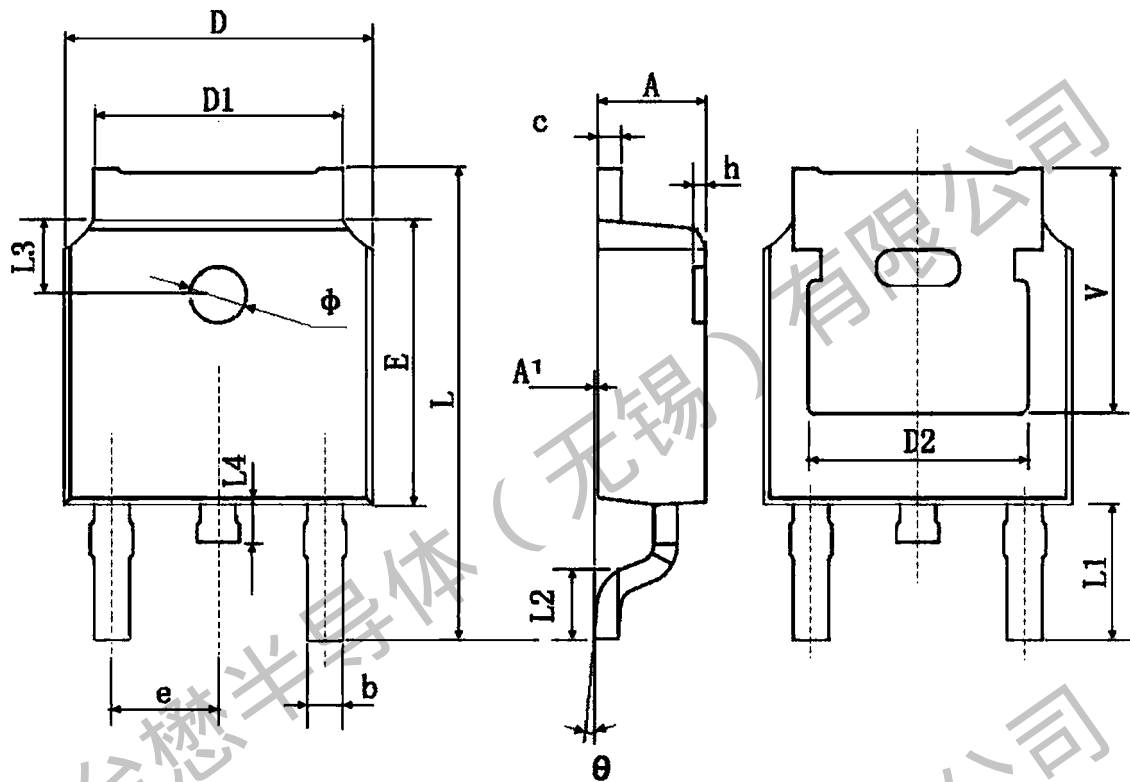


Figure 11. Normalized Maximum Transient Thermal Impedance

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Package Mechanical Data: TO-252-3L

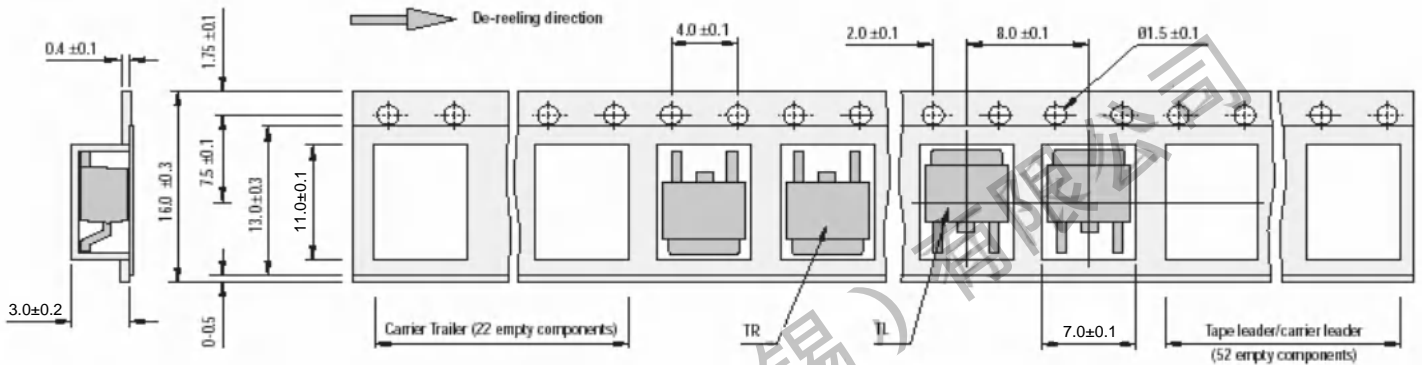


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	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
phi	1.100	1.300	0.043	0.051
theta	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	

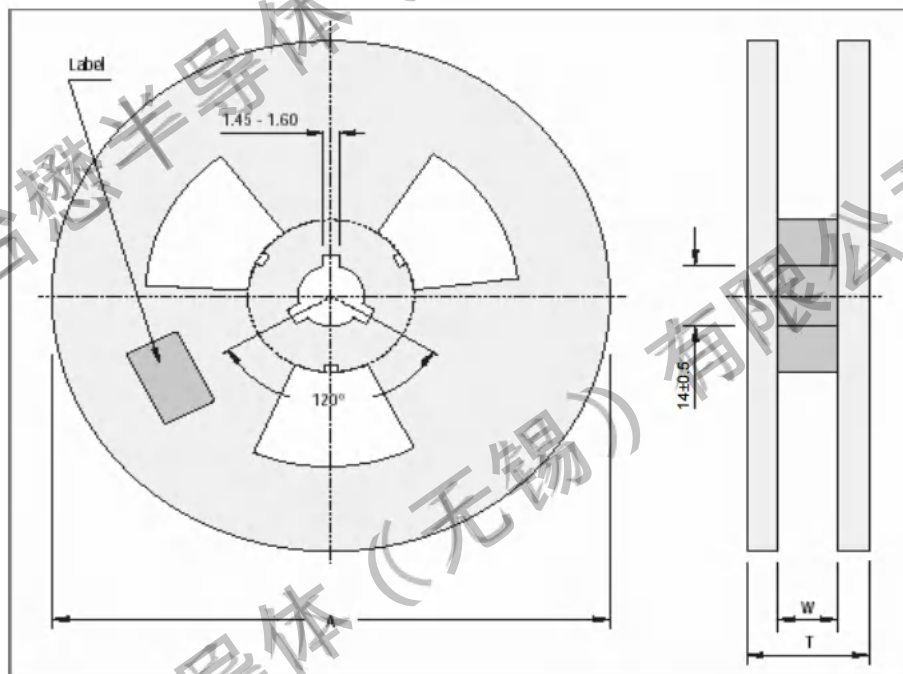
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TO-252-3L Embossed Carrier Tape



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
2023.03.06	23.03	Original	