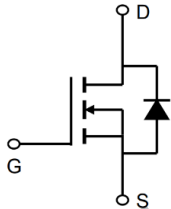


TM50N06P

N-Channel Enhancement Mosfet

General Description • Low $R_{DS(ON)}$ • RoHS and Halogen-Free Compliant Applications • Load switch • PWM	General Features $V_{DS} = 60V$ $I_D = 50A$ $R_{DS(ON)} = 13m\Omega (typ.) @ V_{GS} = 10V$ 100% UIS Tested 100% R_g Tested 																																												
 Marking: 50N06 P:TO-220AB  G D S 																																													
Absolute Maximum Ratings: ($T_C = 25^{\circ}C$ unless otherwise noted) <table><tr><th>Symbol</th><th>Parameter</th><th>Ratings</th><th>Units</th></tr><tr><td>V_{DS}</td><td>Drain-Source Voltage</td><td>60</td><td>V</td></tr><tr><td>V_{GS}</td><td>Gate-Source Voltage</td><td>± 20</td><td>V</td></tr><tr><td rowspan="2">I_D</td><td>Continuous Drain Current</td><td>50</td><td rowspan="3">A</td></tr><tr><td>Continuous Drain Current-$T_C = 100^{\circ}C$</td><td>35.4</td></tr><tr><td>I_{DM}</td><td>Pulsed Drain Current</td><td>190</td></tr><tr><td>P_D</td><td>Power Dissipation</td><td>85</td><td>W</td></tr><tr><td>E_{AS}</td><td>Single pulse avalanche energy (Note 5)</td><td>245</td><td>mJ</td></tr><tr><td>T_J, T_{STG}</td><td>Operating and Storage Junction Temperature Range</td><td>-55-+175</td><td>$^{\circ}C$</td></tr></table> Thermal Characteristics: <table><tr><th>Symbol</th><th>Parameter</th><th>Max</th><th>Units</th></tr><tr><td>$R_{\theta JC}$</td><td>Thermal Resistance, Junction to Case (Note 2)</td><td>1.67</td><td rowspan="2">$^{\circ}C/W$</td></tr><tr><td>$R_{\theta JA}$</td><td>Thermal Resistance, Junction to Ambient¹</td><td>62</td></tr></table>		Symbol	Parameter	Ratings	Units	V_{DS}	Drain-Source Voltage	60	V	V_{GS}	Gate-Source Voltage	± 20	V	I_D	Continuous Drain Current	50	A	Continuous Drain Current- $T_C = 100^{\circ}C$	35.4	I_{DM}	Pulsed Drain Current	190	P_D	Power Dissipation	85	W	E_{AS}	Single pulse avalanche energy (Note 5)	245	mJ	T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55-+175	$^{\circ}C$	Symbol	Parameter	Max	Units	$R_{\theta JC}$	Thermal Resistance, Junction to Case (Note 2)	1.67	$^{\circ}C/W$	$R_{\theta JA}$	Thermal Resistance, Junction to Ambient ¹	62
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Electrical Characteristics: ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Sourctce Breakdown Voltage	V _{GS} =0V, I _D =250 μ A	60	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _{DS} =60V	---	---	1	μ A
I _{GSS}	Gate-Source Leakage Current	V _{GS} =± 20V, V _{DS} =0A	---	---	± 100	nA
On Characteristics (Note3)						
V _{GS(th)}	GATE-Source Threshold Voltage	V _{GS} =V _{DS} , I _D =250 μ A	1.4	1.9	2.5	V
R _{DS(ON)}	Drain-Source On Resistance	V _{GS} =10V, I _D =20A	---	13	18	m Ω
G _{FS}	Forward Transconductance	V _{DS} =5V, I _D =20A	18	---	---	S
Dynamic Characteristics (Note 4)						
C _{iss}	Input Capacitance	V _{DS} =30V, V _{GS} =0V, f=1MHz	---	1900	---	pF
C _{oss}	Output Capacitance		---	150	---	
C _{rss}	Reverse Transfer Capacitance		---	110	---	
Switching Characteristics (Note 4)						
t _{d(on)}	Turn-On Delay Time	V _{DS} =30V, R _L =6.7 Ω R _G =3 Ω, V _{GS} =10V	---	7.2	---	ns
t _r	Rise Time		---	4.9	---	ns
t _{d(off)}	Turn-Off Delay Time		---	27.8	---	ns
t _f	Fall Time		---	5.2	---	ns
Q _g	Total Gate Charge	V _{GS} =10V, V _{DS} =30V, I _D =20A	---	48	---	nC
Q _{gs}	Gate-Source Charge		---	5	---	nC
Q _{gd}	Gate-Drain “Miller” Charge		---	13	---	nC
Drain-Source Diode Characteristics						
I _S	Continuous Drain Curren	VD=VG=0V	---	---	50	A
V _{SD}	Diode Forward Voltage (Note 3)	V _{GS} =0V, I _{SD} =20A	---	---	1.2	V
T _{rr}	Reverse Recovery Time	I _F =20A, T _J =25℃	---	28	---	NS
Q _{rr}	Reverse Recovery Charge	dI/dt=100A/us	---	40	---	NC

Notes :

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. EAS condition : $T_J=25^{\circ}\text{C}, V_{DD}=30V, V_G=10V, L=0.5mH, R_G=25\Omega$

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Typical Characteristics

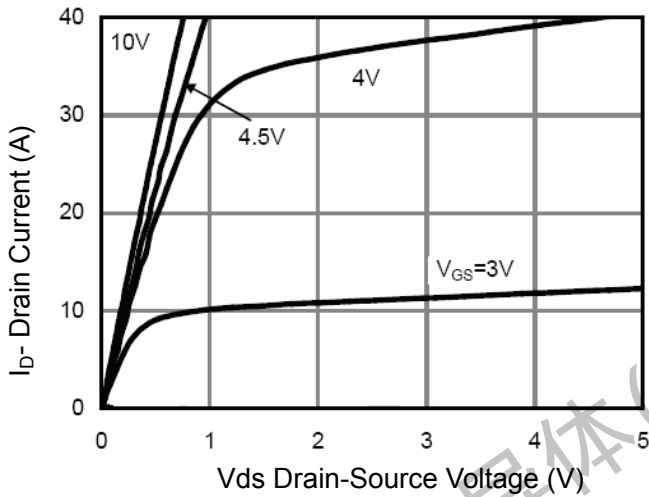


Figure 1 Output Characteristics

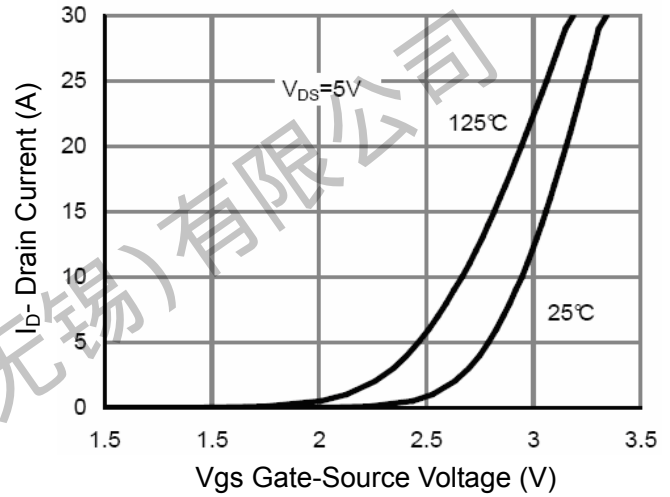


Figure 2 Transfer Characteristics

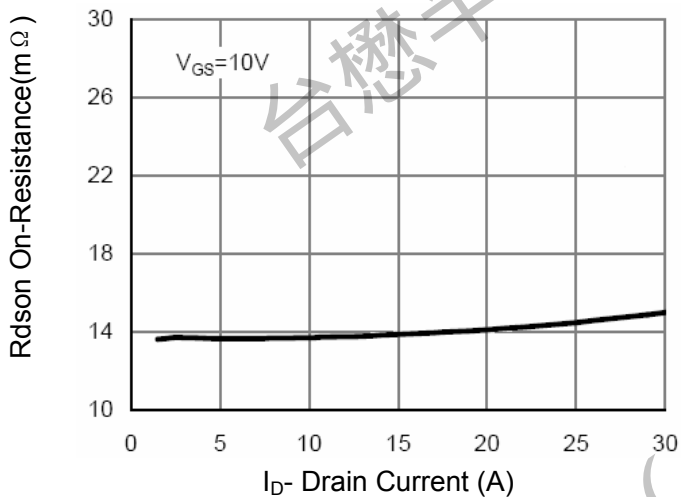


Figure 3 Rdson- Drain Current

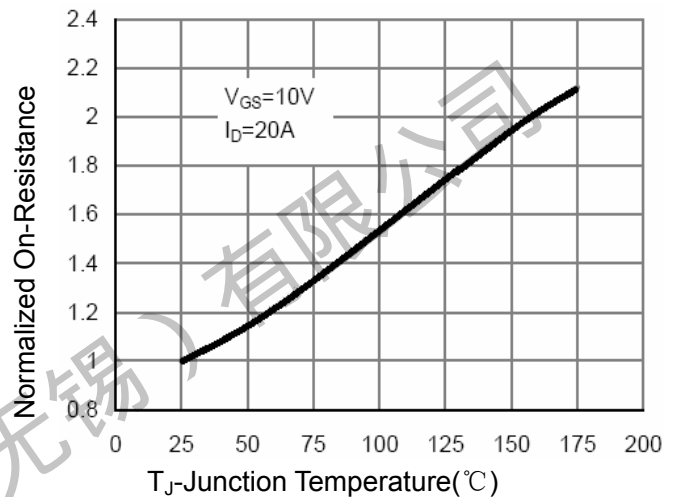


Figure 4 Rdson-Junction Temperature

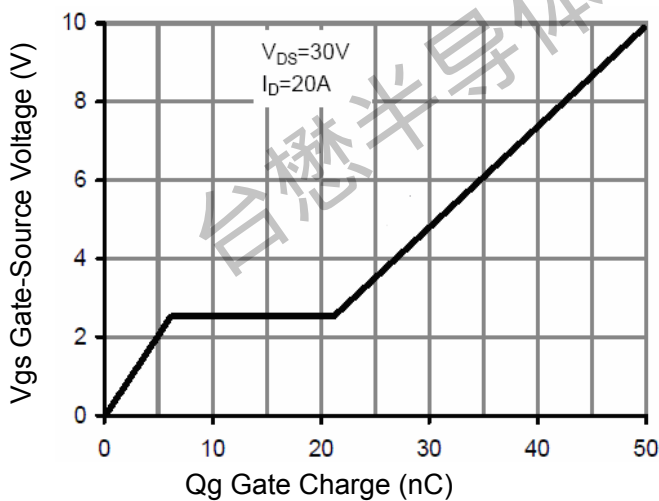


Figure 5 Gate Charge

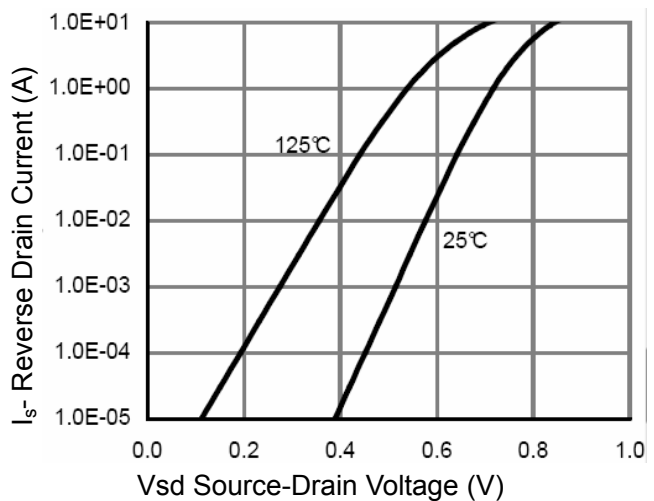


Figure 6 Source- Drain Diode Forward

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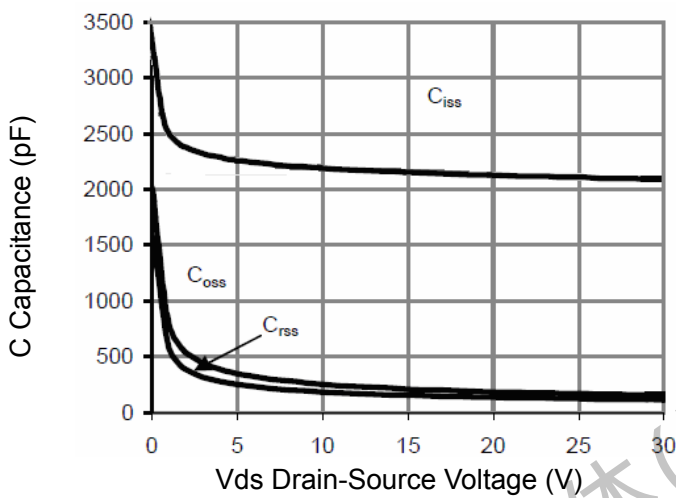


Figure 7 Capacitance vs Vds

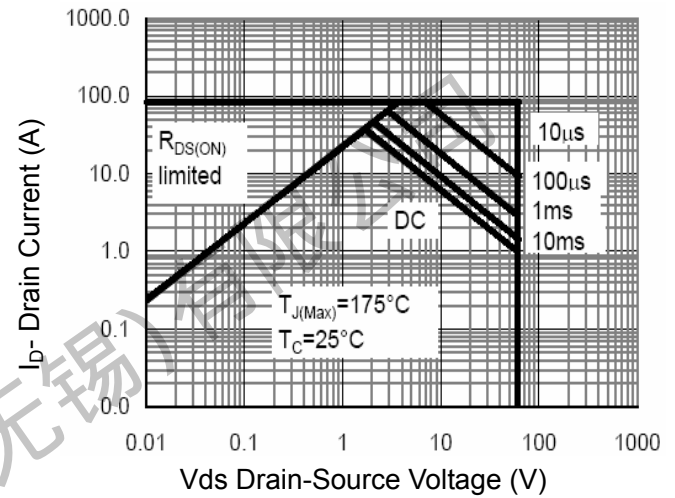


Figure 8 Safe Operation Area

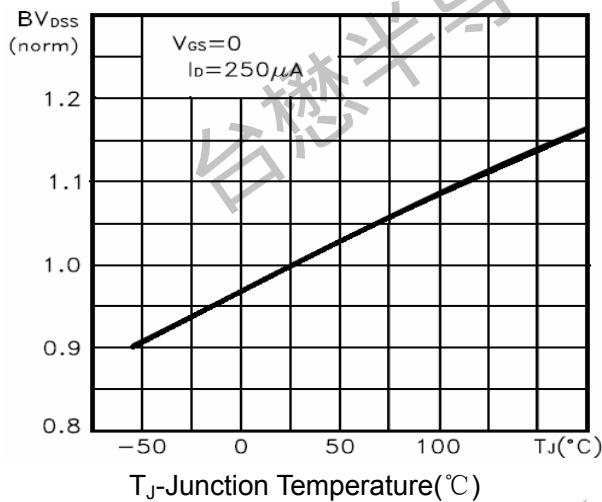


Figure 9 BV_{DSS} vs Junction Temperature

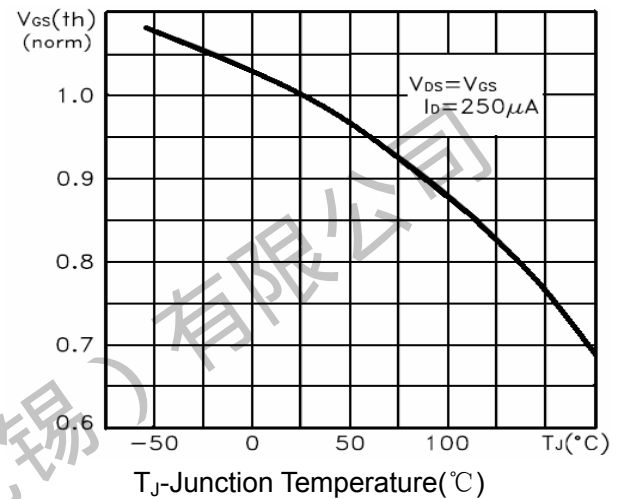


Figure 10 $V_{GS(th)}$ vs Junction Temperature

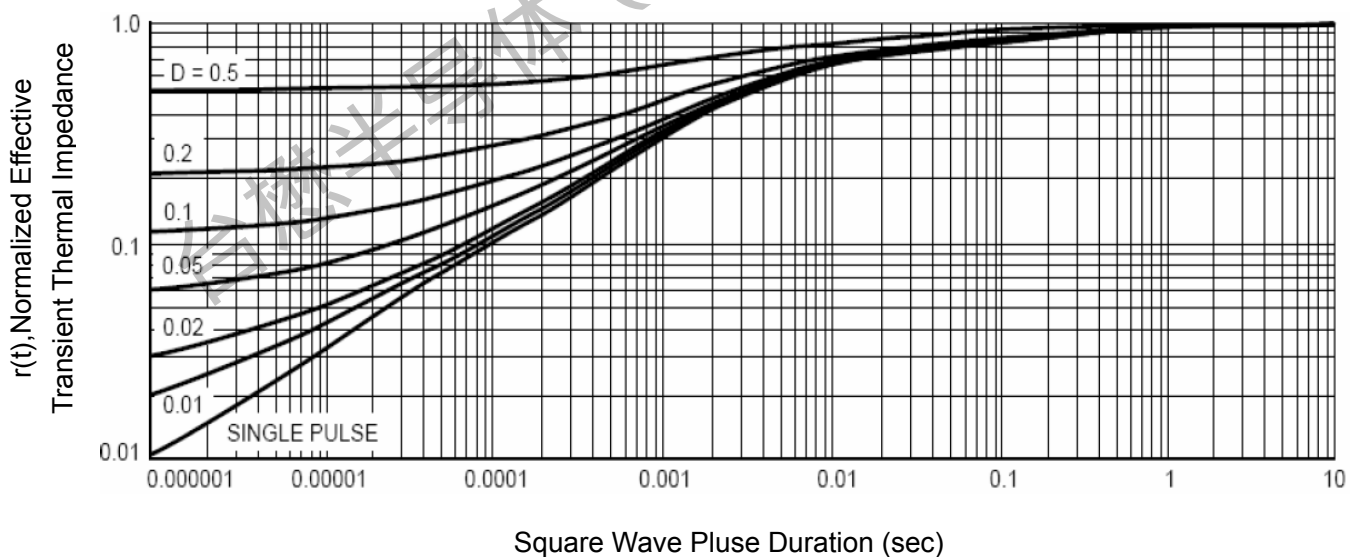
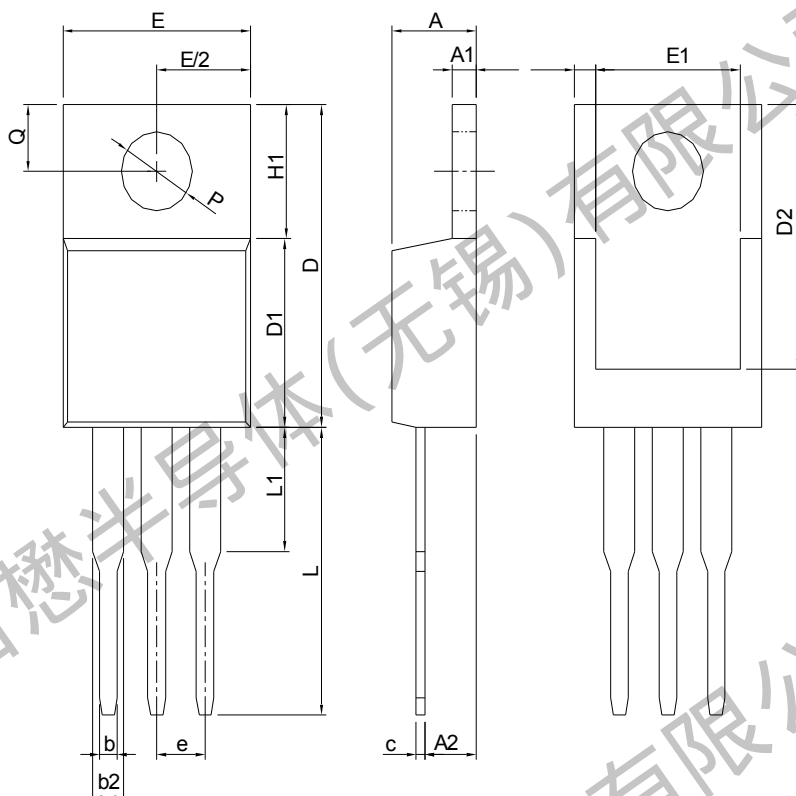


Figure 11 Normalized Maximum Transient Thermal Impedance

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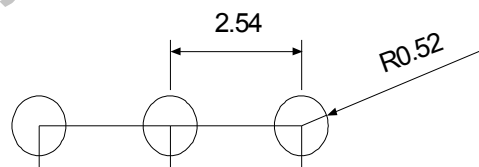
N-Channel Enhancement Mosfet

Package Mechanical Data: TO-220AB



SYMBOL	TO-220			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	3.56	4.83	0.140	0.190
A1	0.51	1.40	0.020	0.055
A2	2.03	2.92	0.080	0.115
b	0.38	1.02	0.015	0.040
b2	1.14	1.78	0.045	0.070
c	0.36	0.61	0.014	0.024
D	14.22	16.51	0.560	0.650
D1	8.38	9.02	0.330	0.355
D2	12.19	13.65	0.480	0.537
E	9.65	10.67	0.380	0.420
E1	6.86	8.89	0.270	0.350
e	2.54 BSC		0.100 BSC	
H1	5.84	6.86	0.230	0.270
L	12.70	14.73	0.500	0.580
L1	-	6.35	-	0.250
P	3.53	4.09	0.139	0.161
Q	2.54	3.43	0.100	0.135

RECOMMENDED LAND PATTERN



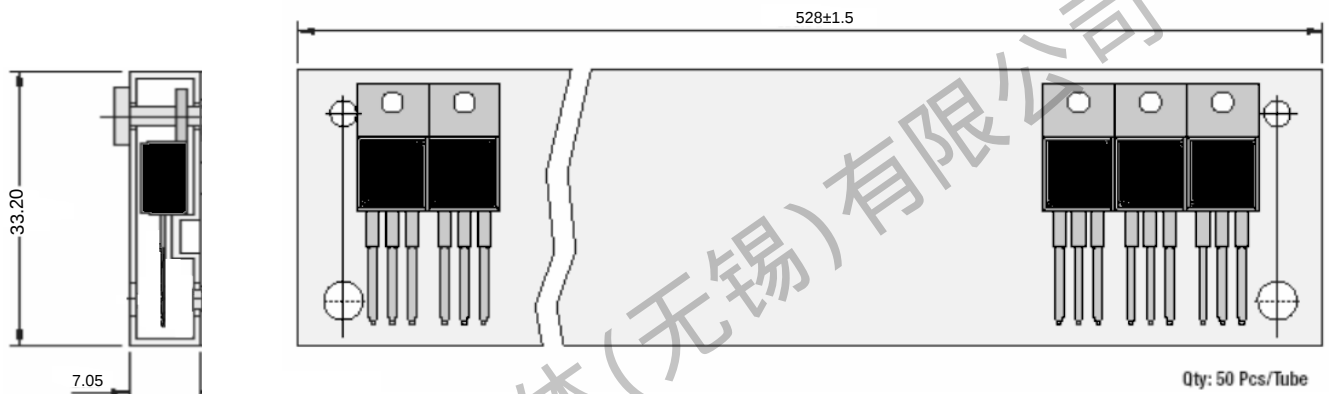
UNIT: mm

Note: Follow JEDEC TO-220 AB.



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N-Channel Enhancement Mosfet



All Dimensions are in mm

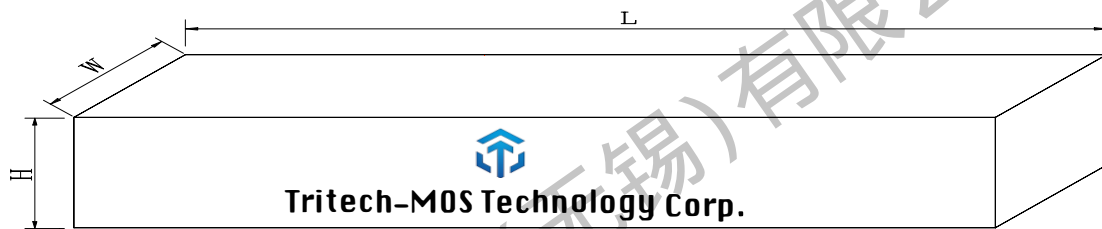
1.TO-220AB Packaging

Package	Packing Form	Quantity		
		Tube	Inner Box [kpcs]	Outbox [kpcs]
TO-220AB	Tube Tape	50	5	1

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N-Channel Enhancement Mosfet

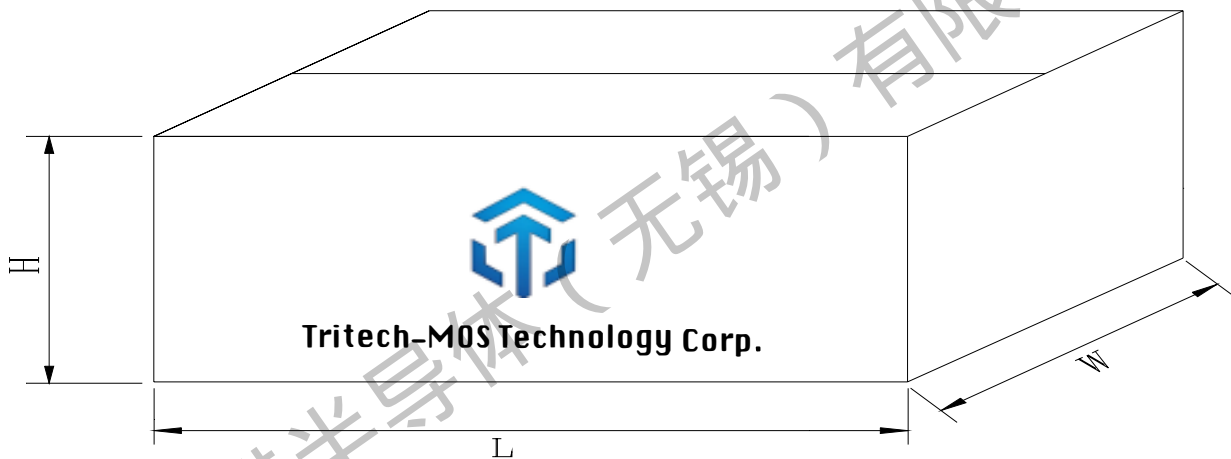
Inner Box



Dimension : 580 (L)×154(W) ×49(H) mm

Quantity : 50 ×20Ea = 1Kpcs

Outer Box



Dimension : 595(L)×285(W) ×185(H) mm

Quantity : 1K×5Ea = 5Kpcs

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Revision history:

Date	Rev	Description	Page
2023.04.01	23.04	Original	