

TM80N04P

N-Channel Enhancement Mosfet

General Description

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

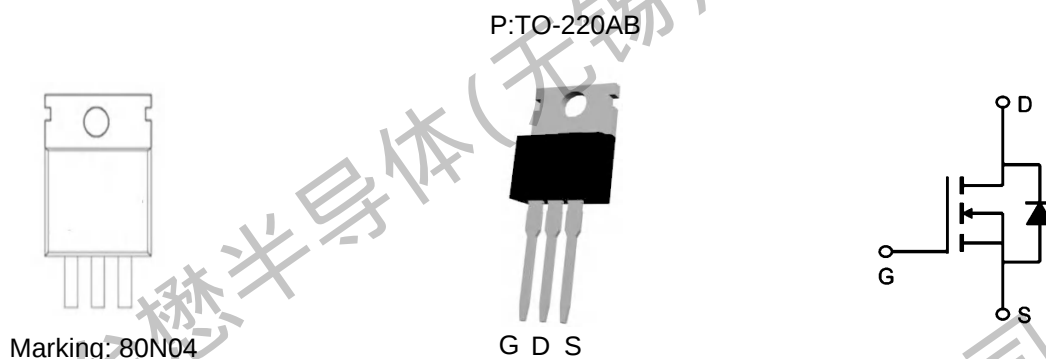
Applications

- Load switch
- PWM

General Features

$V_{DS} = 40V$ $I_D = 80A$
 $R_{DS(ON)} = 5.3m\Omega (typ.) @ V_{GS} = 10V$

100% UIS Tested
 100% R_g Tested



Absolute Maximum Ratings: ($T_c = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current ¹	80	A
	Continuous Drain Current- $T_C = 100^\circ C$	52	
	Pulsed Drain Current ²	296	
E_{AS}	Single Pulse Avalanche Energy ³	670	mJ
P_D	Power Dissipation ⁴	90	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +175	$^\circ C$

Thermal Characteristics:

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case ¹	1.67	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient ¹	---	

TM80N04P

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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-Source Breakdown Voltage	V _{GS} =0V, I _D =250 μA	40	45	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _{DS} =40V	---	---	1	μA
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0A	---	---	±100	nA
On Characteristics						
V _{GS(th)}	GATE-Source Threshold Voltage	V _{GS} =V _{DS} , I _D =250 μA	1.2	1.6	2.0	V
R _{DS(on)}	Drain-Source On Resistance ²	V _{GS} =10V, I _D =20A	---	5.3	6.2	mΩ
		V _{GS} =4.5V, I _D =A	---	6.2	7.1	
G _{FS}	Forward Transconductance	V _{DS} =10V, I _D =20A	15	---	---	S
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =20V, V _{GS} =0V, f=1MHz	---	3298	---	pF
C _{OSS}	Output Capacitance		---	750	---	
C _{rss}	Reverse Transfer Capacitance		---	390	---	
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} =20V, R _L =1Ω R _{GEN} =3Ω, V _{GS} =10V	---	11	---	ns
t _r	Rise Time		---	10	---	ns
t _{d(off)}	Turn-Off Delay Time		---	38	---	ns
t _f	Fall Time		---	11	---	ns
Q _g	Total Gate Charge	V _{GS} =10V, V _{DS} =20V, I _D =20A	---	50	---	nC
Q _{gs}	Gate-Source Charge		---	12	---	nC
Q _{gd}	Gate-Drain “Miller” Charge		---	13	---	nC
Drain-Source Diode Characteristics						
V _{SD}	Source-Drain Diode Forward Voltage ²	V _{GS} =0V, I _S =10A	---	---	-1.2	V
I _S	Diode Forward Current (Note 2)	---	---	---	80	A
T _{rr}	Reverse Recovery Time	T _J = 25°C, I _F = 20A di/dt = 100A/μs ^(Note3)	---	33	---	NS
Q _{rr}	Reverse Recovery Charge		---	34	---	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 : $T_J=25^{\circ}\text{C}, V_{DD}=20V, V_{GS}=10V, L=1mH, R_g=25\Omega, I_{AS}=36A$

TM80N04P

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Typical Characteristics

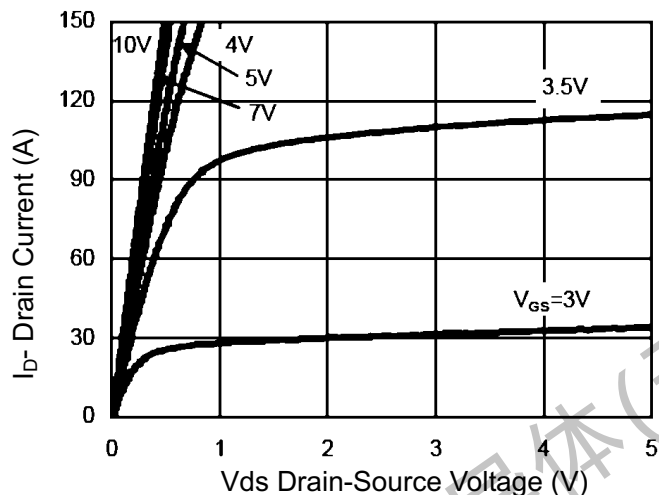


Figure 1 Output Characteristics

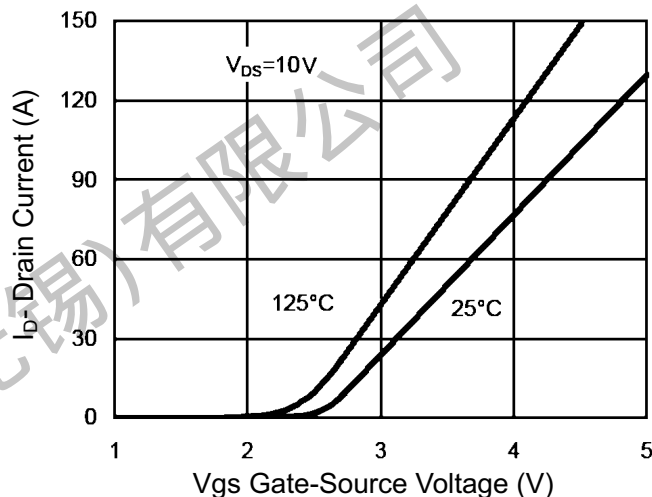


Figure 2 Transfer Characteristics

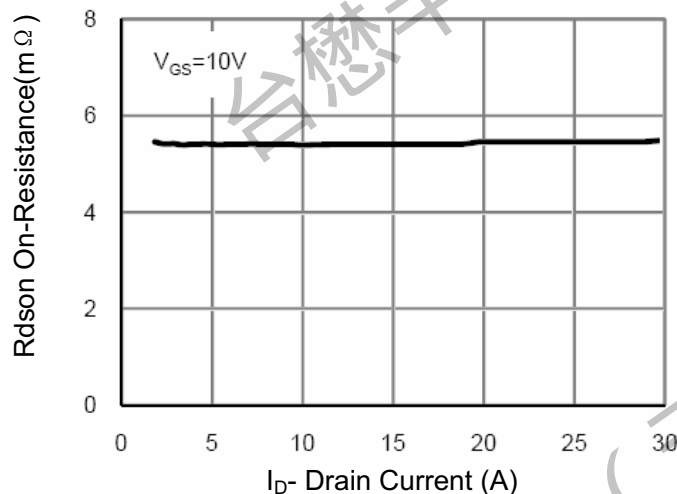


Figure 3 Rdson- Drain Current

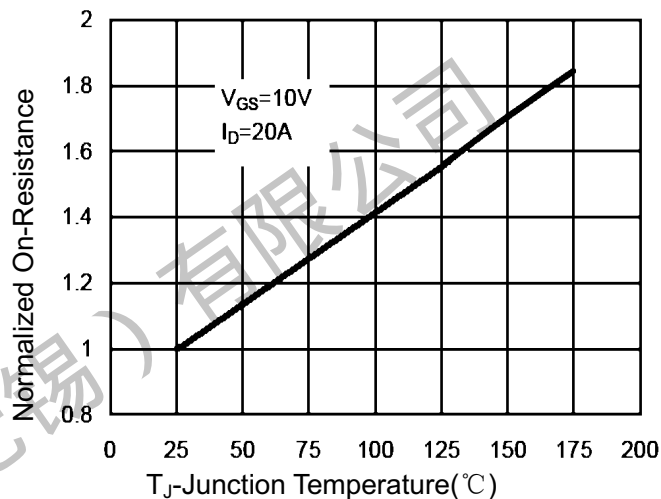


Figure 4 Rdson-Junction Temperature

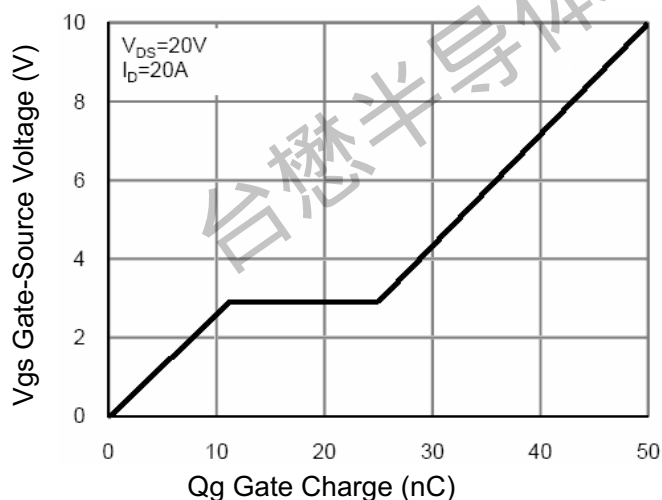


Figure 5 Gate Charge

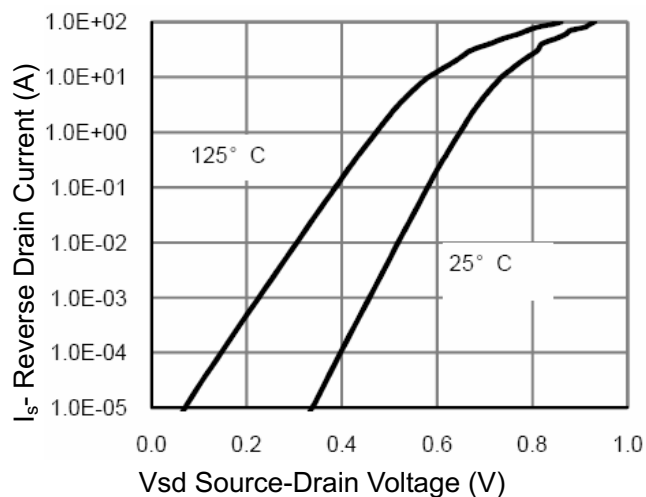


Figure 6 Source- Drain Diode Forward



TM80N04P

N-Channel Enhancement Mosfet

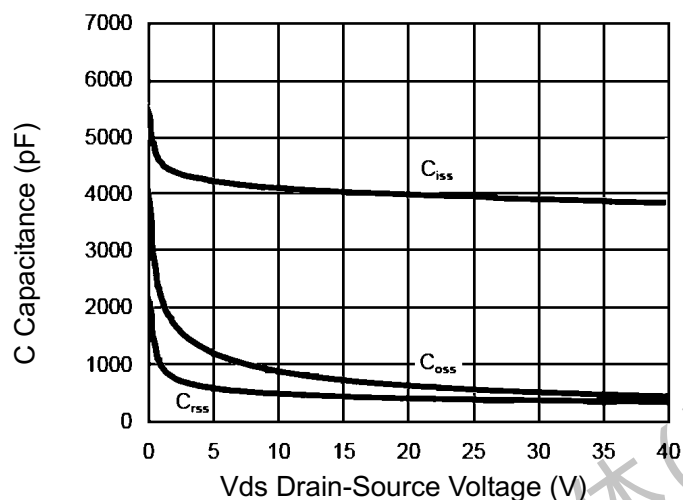


Figure 7 Capacitance vs Vds

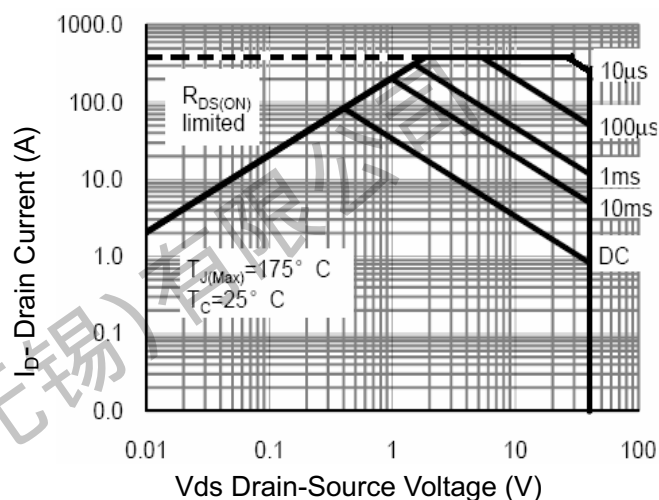


Figure 8 Safe Operation Area

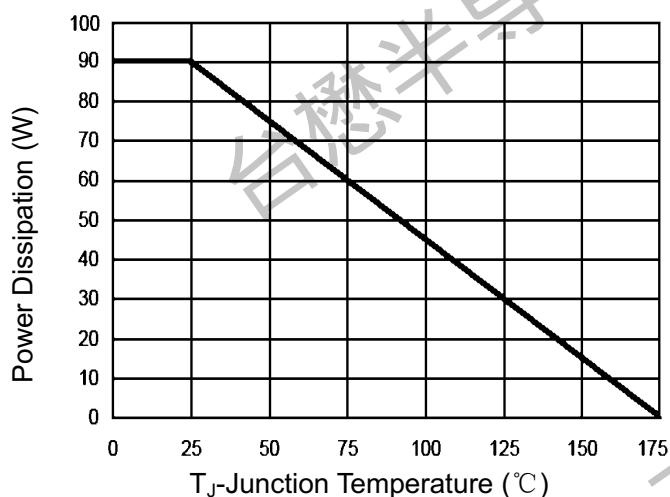


Figure 9 Power De-rating

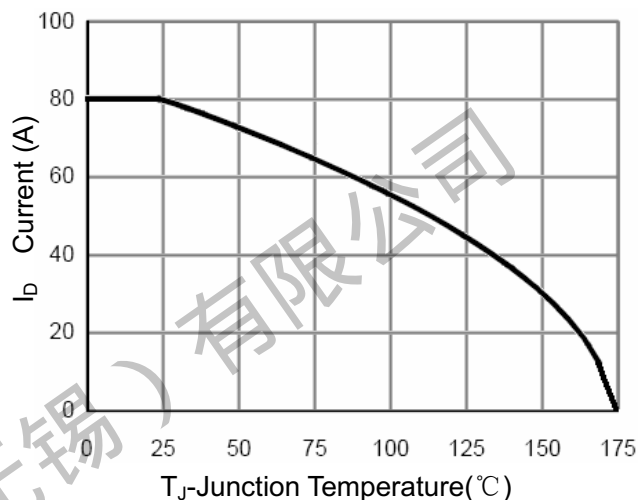


Figure 10 Id Current- Junction Temperature

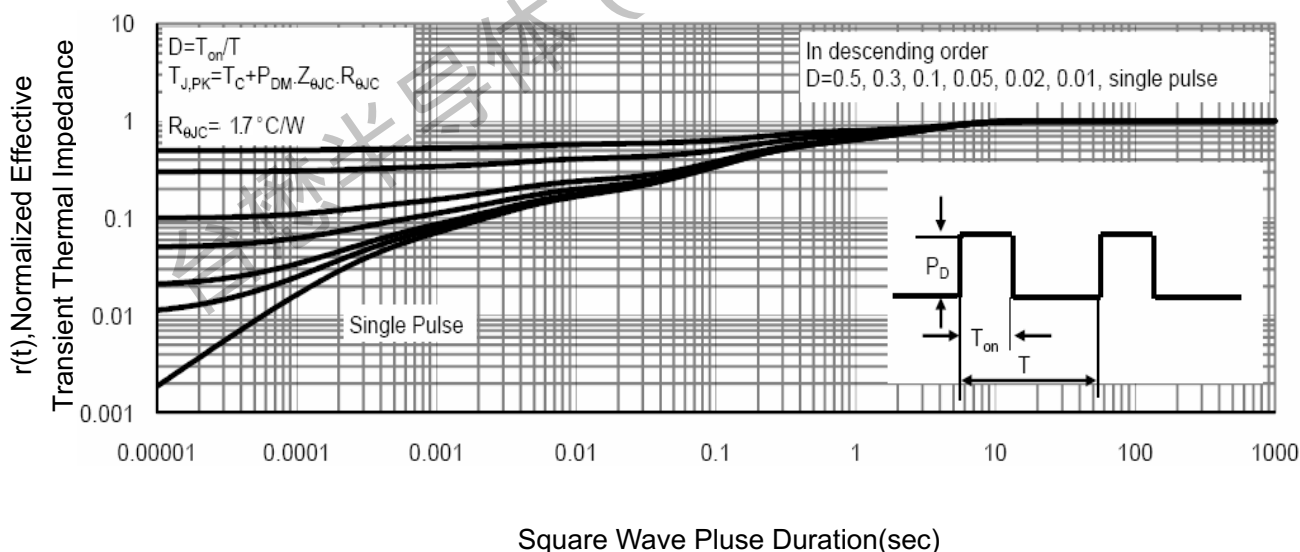
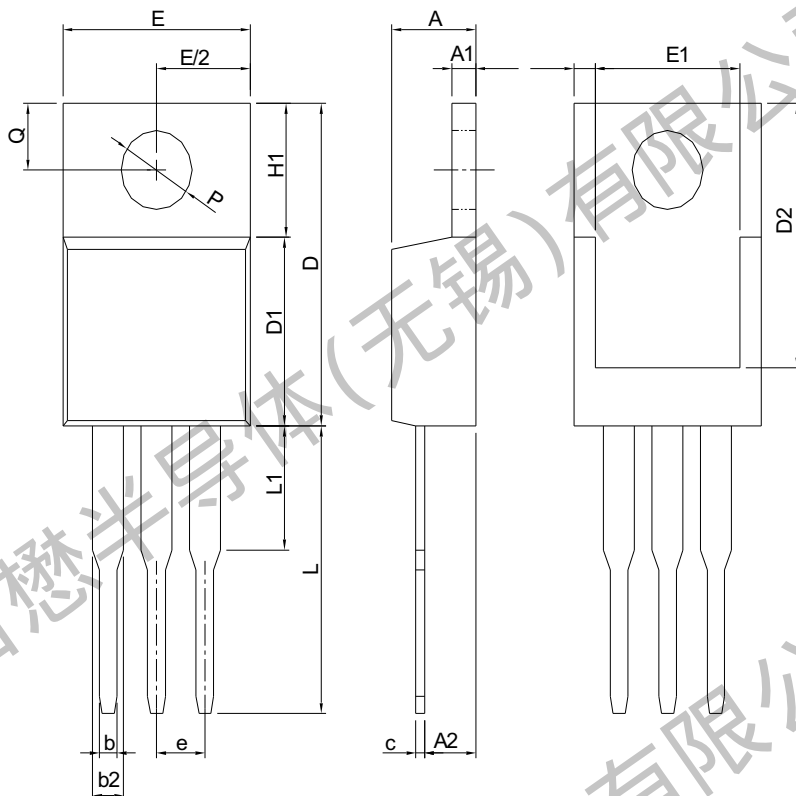


Figure 11 Normalized Maximum Transient Thermal Impedance

TM80N04P

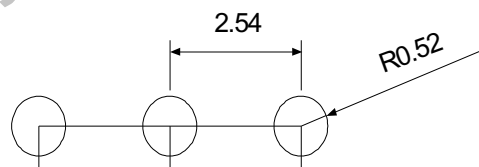
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Package Mechanical Data: TO-220AB



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

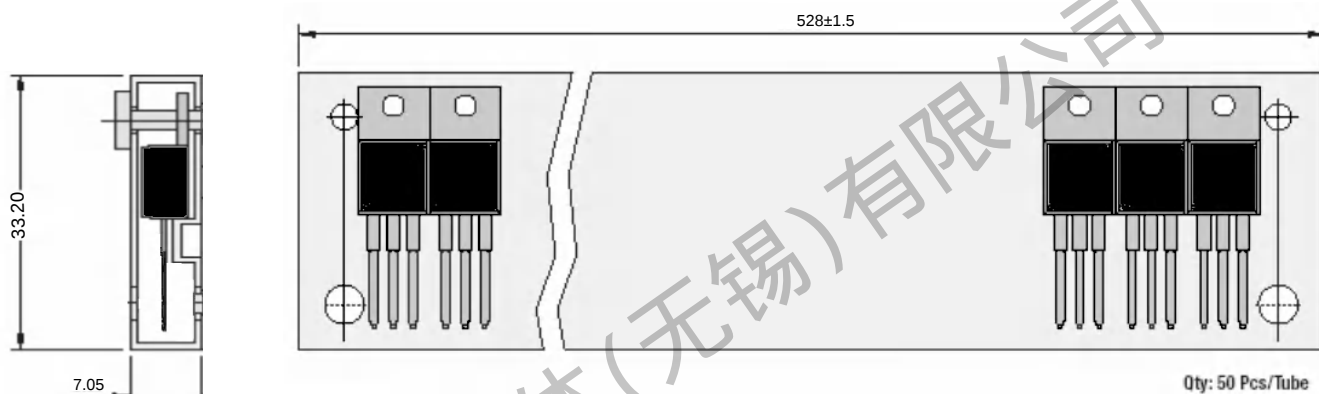


UNIT: mm

Note: Follow JEDEC TO-220 AB.

TM80N04P

N-Channel Enhancement Mosfet



All Dimensions are in mm

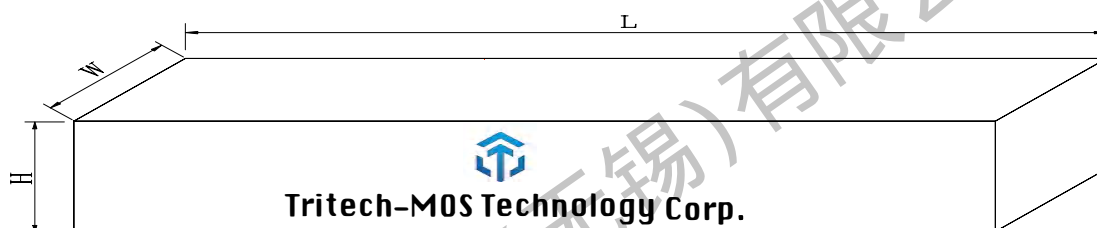
1.TO-220AB Packaging

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

TM80N04P

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
2023.09.11	23.09	Original	