

TM110P04P

P-Channel Enhancement Mosfet

General Description • Low $R_{DS(ON)}$ • RoHS and Halogen-Free Compliant Applications • Load switch • PWM	General Features $V_{DS} = -40V$ $I_D = -110 A$ $R_{DS(ON)} = 4.5m\Omega (typ.) @ V_{GS} = -10V$ 100% UIS Tested 100% R_g Tested 																																								
Marking:110P04 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>-40</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="3">I_D</td><td>Continuous Drain Current</td><td>-110</td><td rowspan="3">A</td></tr><tr><td>Continuous Drain Current-$T_C = 100^{\circ}C$</td><td>-73</td></tr><tr><td>Pulsed Drain Current</td><td>-416</td></tr><tr><td>P_D</td><td>Power Dissipation</td><td>115</td><td>W</td></tr><tr><td>E_{AS}</td><td>Single pulse avalanche energy</td><td>576</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</td><td>1.3</td><td>$^{\circ}C/W$</td></tr></table>		Symbol	Parameter	Ratings	Units	V_{DS}	Drain-Source Voltage	-40	V	V_{GS}	Gate-Source Voltage	± 20	V	I_D	Continuous Drain Current	-110	A	Continuous Drain Current- $T_C = 100^{\circ}C$	-73	Pulsed Drain Current	-416	P_D	Power Dissipation	115	W	E_{AS}	Single pulse avalanche energy	576	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	1.3	$^{\circ}C/W$
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Electrical Characteristics: (T_c=25℃ 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	-40	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _{DS} =-40V	---	---	-1	μ A
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 μ A	-1.4	-1.75	-2.0	V
R _{DS(ON)}	Drain-Source On Resistance	V _{GS} =-10V,I _D =-20A	---	4.5	5.5	m Ω
		V _{GS} =-4.5V,I _D =-20A	---	6.1	8	m Ω
Dynamic Characteristics						
C _{iSS}	Input Capacitance	V _{DS} =-20V, V _{GS} =0V, f=1MHz	---	6338	---	pF
C _{oSS}	Output Capacitance		---	525	--	
C _{rSS}	Reverse Transfer Capacitance		---	335	---	
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DS} =-20V R _{ENG} =3 Ω ,V _{GS} =-10V	---	16.8	---	ns
t _r	Rise Time		---	16.2	---	ns
t _{d(off)}	Turn-Off Delay Time		---	69	---	ns
t _f	Fall Time		---	32	---	ns
Q _g	Total Gate Charge	V _{GS} =-10V, V _{DS} =-20V, I _D =-20A	---	120	---	nc
Q _{gs}	Gate-Source Charge		---	12.4	---	nc
Q _{gd}	Gate-Drain “Miller” Charge		---	23	---	nc
Drain-Source Diode Characteristics						
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _{SD} =-20A	---	---	-1.2	V
I _S	Continuous Drain Curren	VD=VG=0V	---	-110	---	A
I _{SM}	Pulsed Drain Current		---	---	-416	A
T _{rr}	Reverse Recovery Time	I _f =-20A,T _J =25℃	---	24	---	ns
Q _{rr}	Reverse Recovery Charge	dI/dt=100A/us	---	140	---	nc

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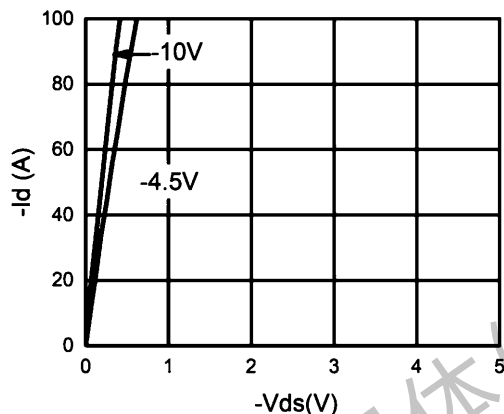


Figure 1. Output Characteristics

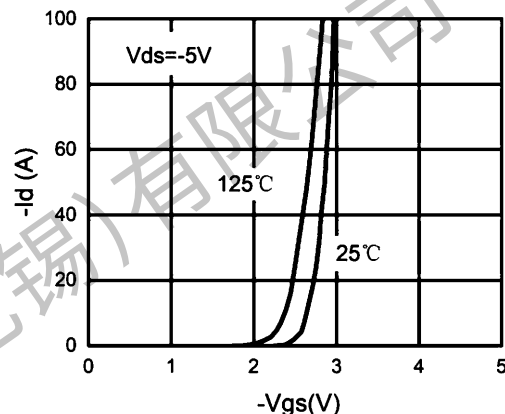


Figure 2. Transfer Characteristics

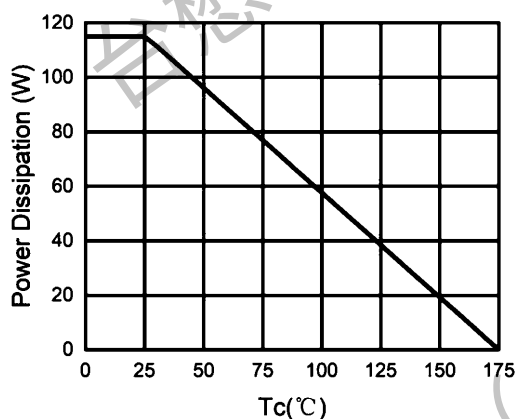


Figure 3. Power Dissipation

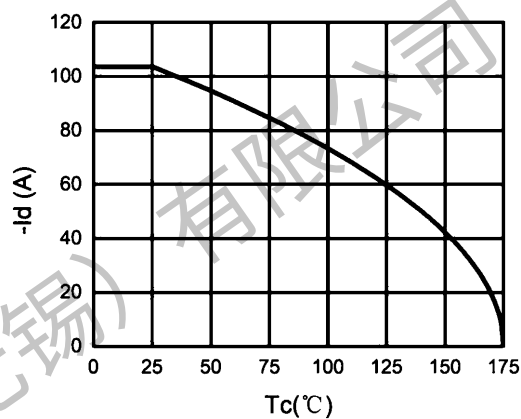


Figure 4. Drain Current

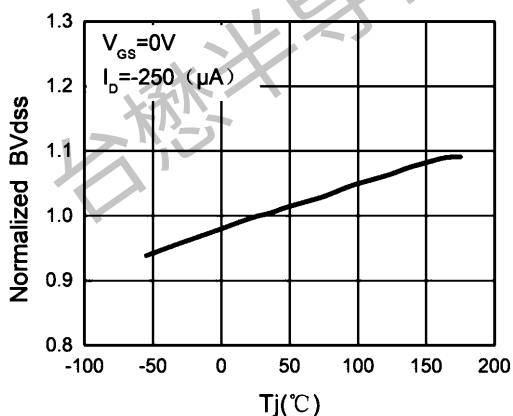


Figure 5. BV_{DSS} vs Junction Temperature

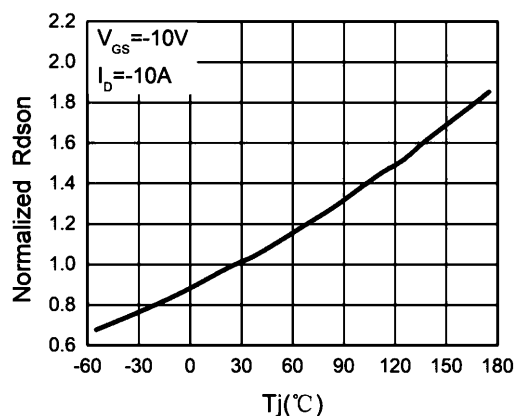


Figure 6. $R_{DS(ON)}$ vs Junction Temperature

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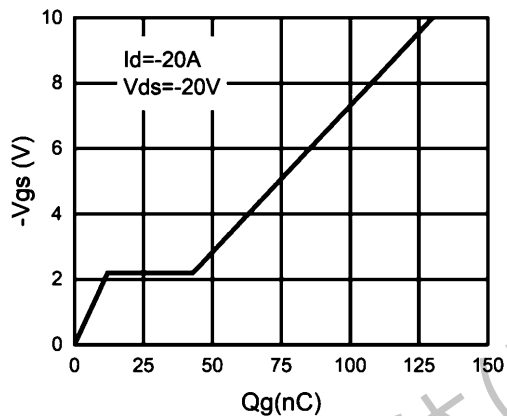


Figure 7. Gate Charge Waveforms

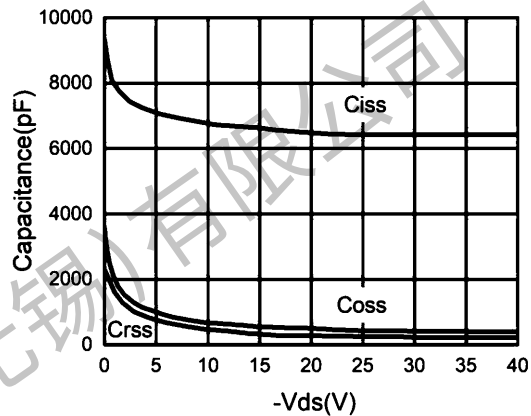


Figure 8. Capacitance

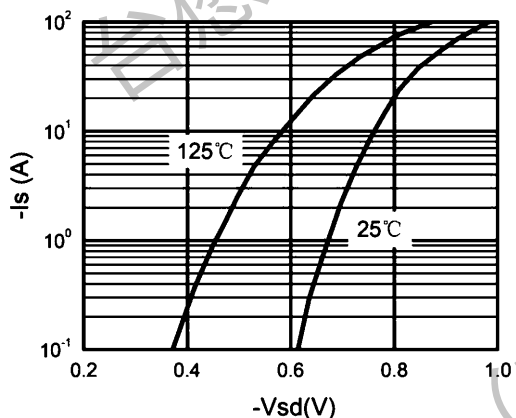


Figure 9. Body-Diode Characteristics

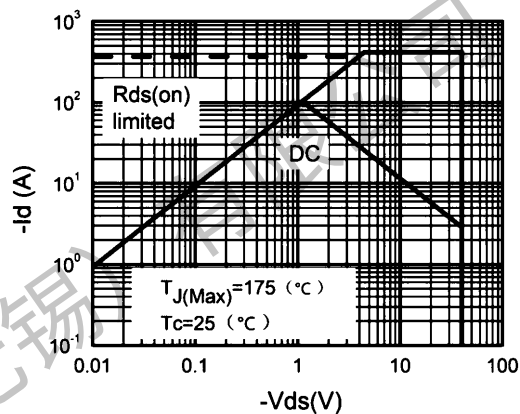
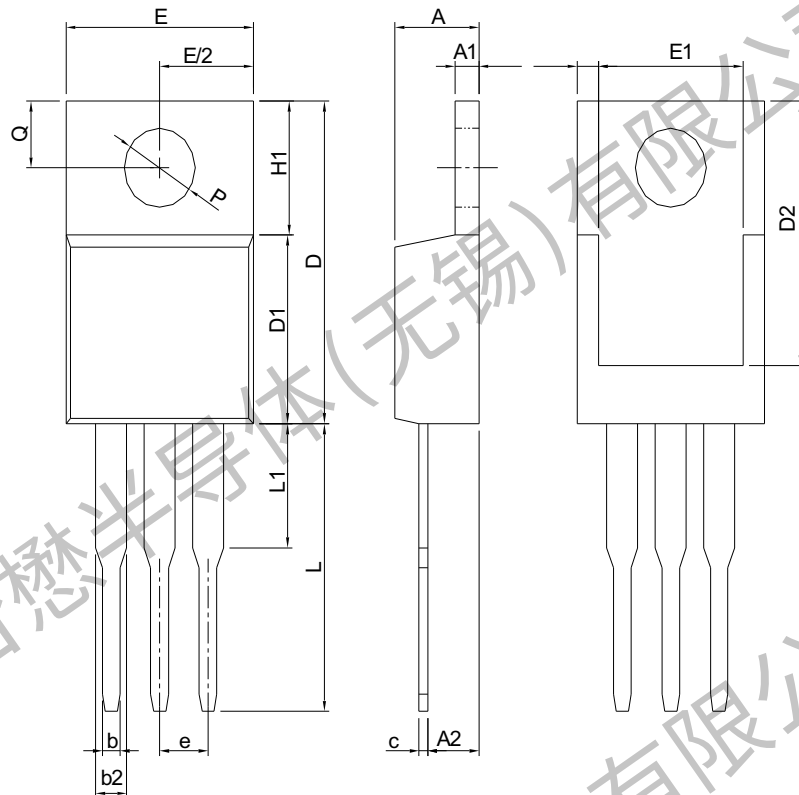


Figure 10. Maximum Safe Operating Area

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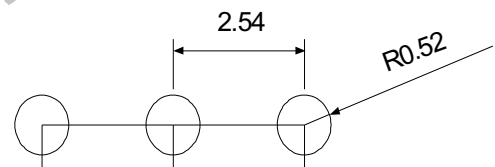
P-Channel Enhancement Mosfet

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

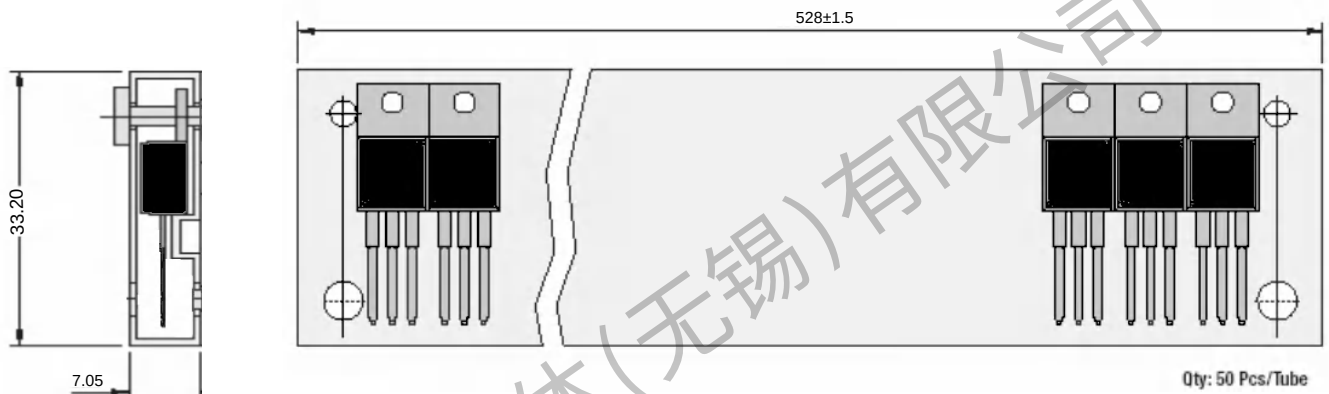


UNIT: mm

Note: Follow JEDEC TO-220 AB.

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All Dimensions are in mm

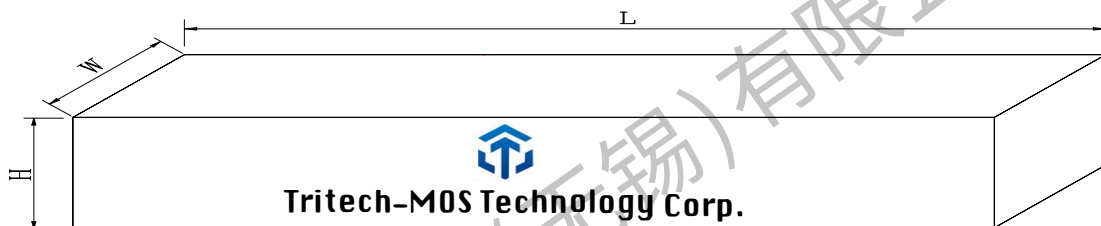
1.TO-220AB Packaging

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

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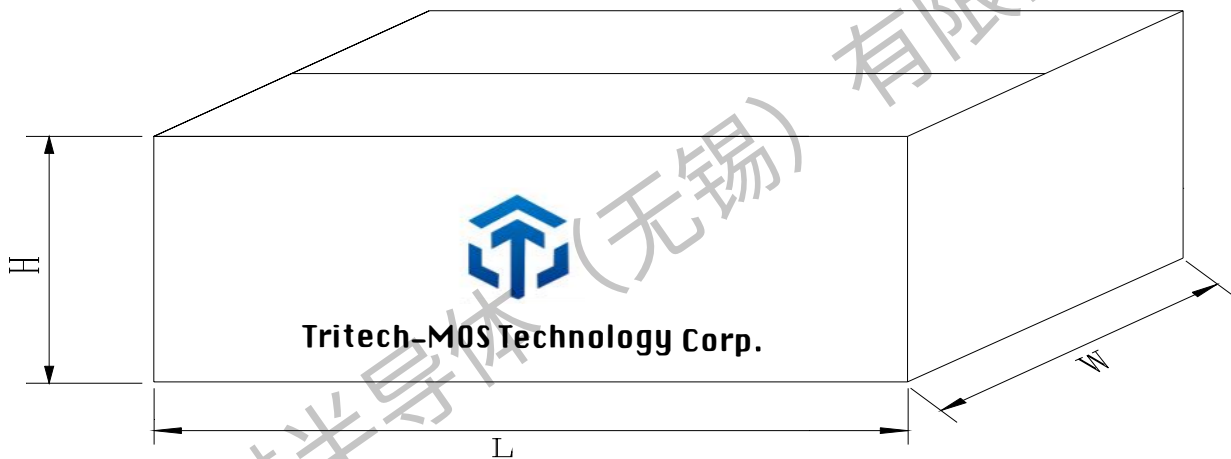
Inner Box



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
2023.08.30	23.08	Original	