

TMG120P06T

P-Channel Enhancement Mosfet

General Description

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

Applications

- Load switch
- PWM

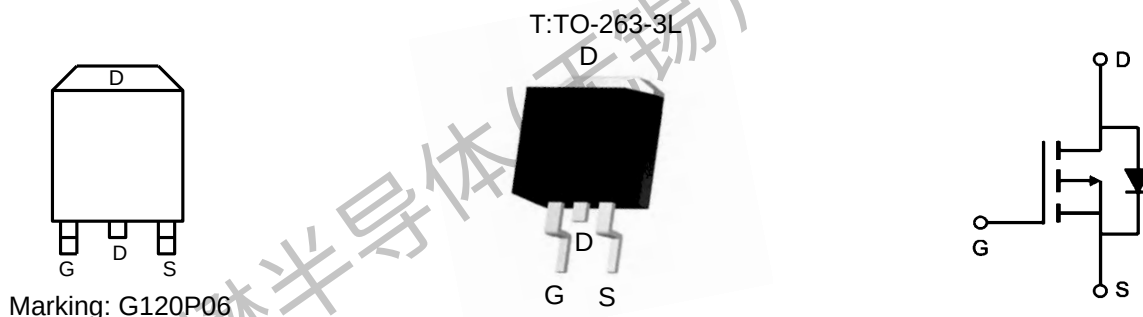
General Features

$V_{DS} = -60V$ $I_D = -120A$

$R_{DS(ON)} = 5.4 m\Omega$ (typ.) @ $V_{GS} = -10V$

100% UIS Tested

100% R_g Tested



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

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-Source Voltage	-60	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current	-120	A
	Continuous Drain Current- $T_C = 100^\circ C$	-78	
I_{DM}	Pulsed Drain Current	-444	
P_D	Power Dissipation $T_C = 25^\circ C$	180	W
E_{AS}	Single pulse avalanche energy	960	mJ
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55-+175	$^\circ C$

Thermal Characteristics:

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	2	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62	$^\circ C/W$

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Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise specified):

Static Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
V _{DSS}	Drain to Source Breakdown Voltage	V _{GS} =0V,I _D =-250μA	-60	--	--	V
I _{DSS}	Drain to Source Leakage Current	V _{DS} = -60V, V _{GS} = 0V	--	--	1	μA
I _{GSS(F)}	Gate to Source Forward Leakage	V _{GS} =-20V	--	--	100	nA
I _{GSS(R)}	Gate to Source Reverse Leakage	V _{GS} =+20V	--	--	-100	nA
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} =V _{GS} ,I _D =-250μA	-1.0	-2.0	3.0	V
R _{DS(ON)}	Drain-to-Source On-Resistance	V _{GS} =-10V,I _D =-15A	--	5.4	6.2	mΩ
		V _{GS} =-4.5V,I _D =-5A		6.3	7.2	
Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
C _{iss}	Input Capacitance	V _{GS} =0V V _{DS} =-30V f=1.0MHz	--	5403	--	pF
C _{oss}	Output Capacitance		--	941	--	
C _{rss}	Reverse Transfer Capacitance		--	48	--	
R _g	Gate resistance	V _{GS} =0V, V _{DS} Open	--	2.0	--	Ω
Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
t _{d(ON)}	Turn-on Delay Time	I _D =-15A, R _L =0.75Ω V _{DS} = -30V V _{GS} = -10V R _G = 3Ω	--	4.5	--	ns
t _r	Rise Time		--	2.5	--	
t _{d(OFF)}	Turn-Off Delay Time		--	14.5	--	
t _f	Fall Time		--	3.5	--	
Q _g	Total Gate Charge	V _{GS} =-10V V _{DS} =-30V I _D =-15A	--	80.2	--	nC
Q _{gs}	Gate Source Charge		--	15.2	--	
Q _{gd}	Gate Drain Charge		--	11	--	
Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
I _S	Diode Forward Current	T _C =25 °C	--	--	-120	A
V _{SD}	Diode Forward Voltage	I _S =-15A,V _{GS} =0V	--	--	-1.2	V
t _{rr}	Reverse Recovery Time	I _S =-15A,V _{DD} =-30V dI/dt=100A/μs	--	60	--	ns
Q _{rr}	Charge		--	105	--	nC

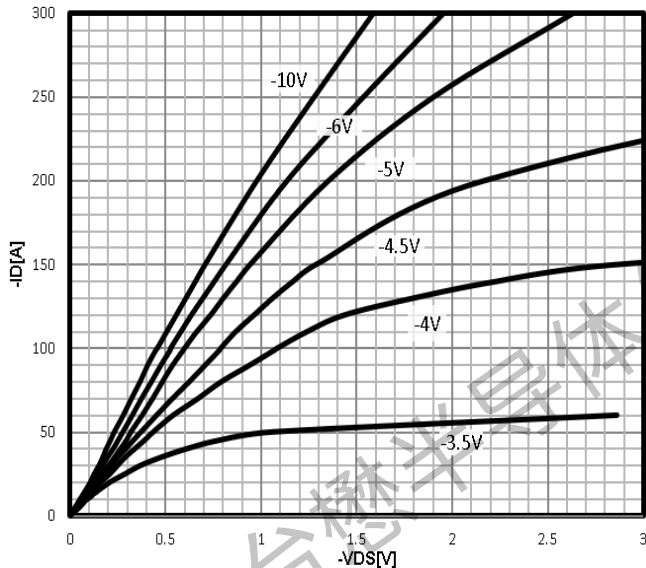
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Characteristics Curve:

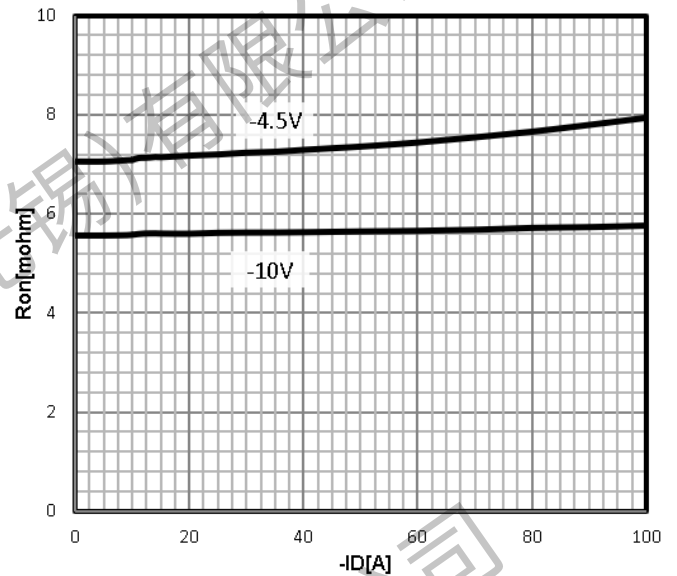
Typ. output characteristics

$$I_D = f(V_{DS})$$



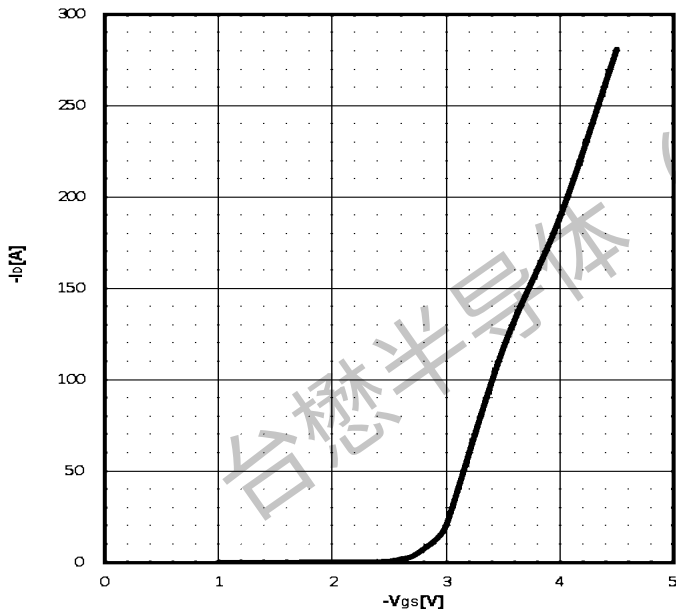
Typ. drain-source on resistance

$$R_{DS(on)} = f(I_D)$$



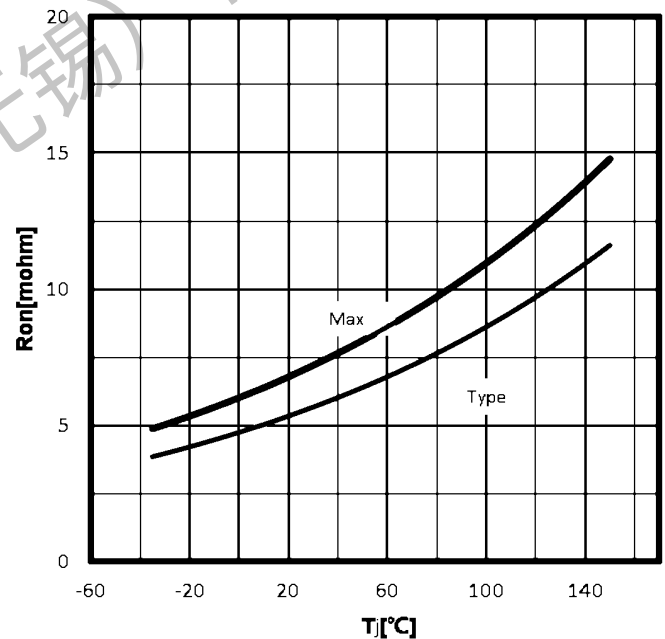
Typ. transfer characteristics

$$I_D = f(V_{GS})$$



Drain-source on-state resistance

$$R_{DS(on)} = f(T_J); I_D = -15A; V_{GS} = -10V$$

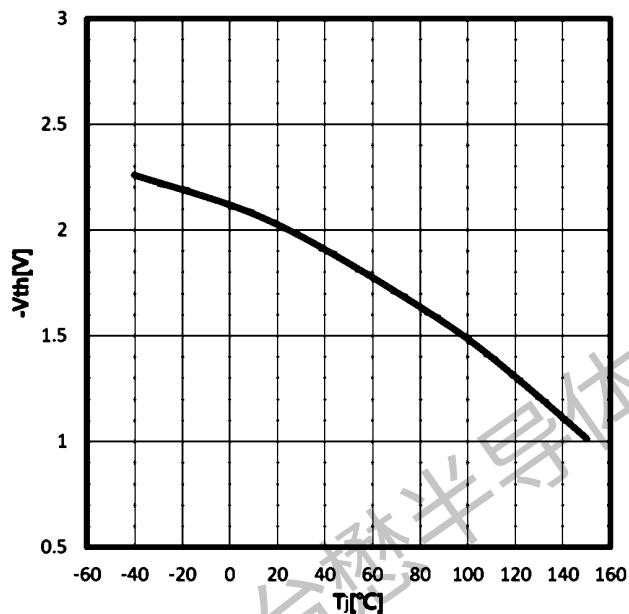


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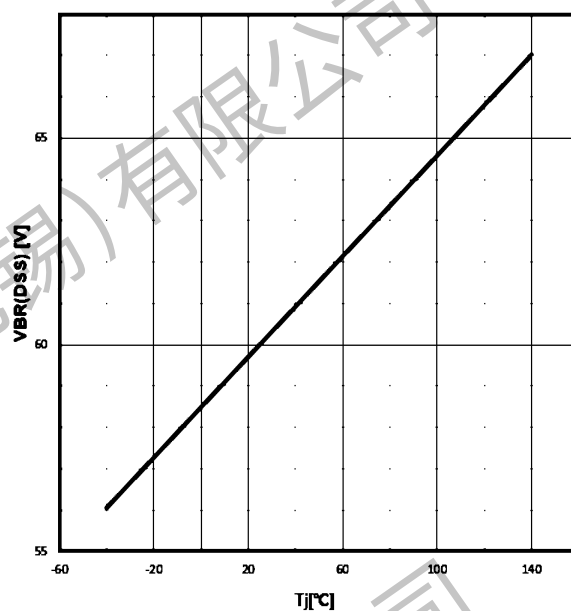
Gate Threshold Voltage

$$-V_{TH}=f(T_j); I_D=-250\mu A$$



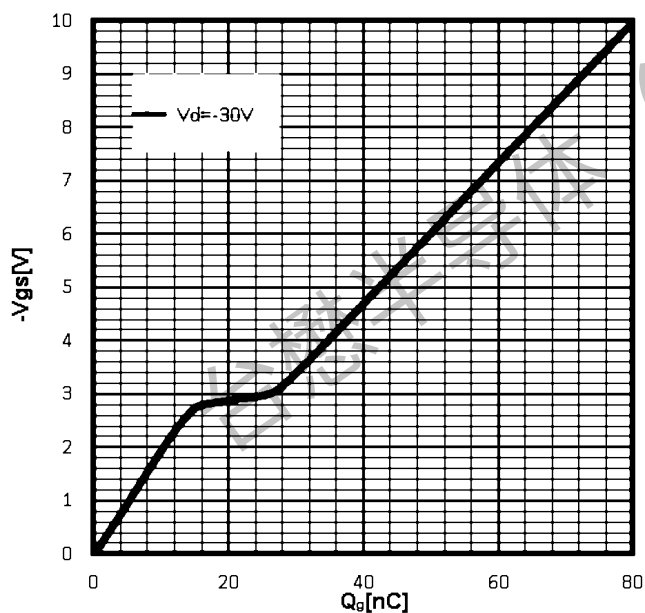
Drain-source breakdown voltage

$$V_{BR(DSS)}=f(T_j); I_D=-250\mu A$$



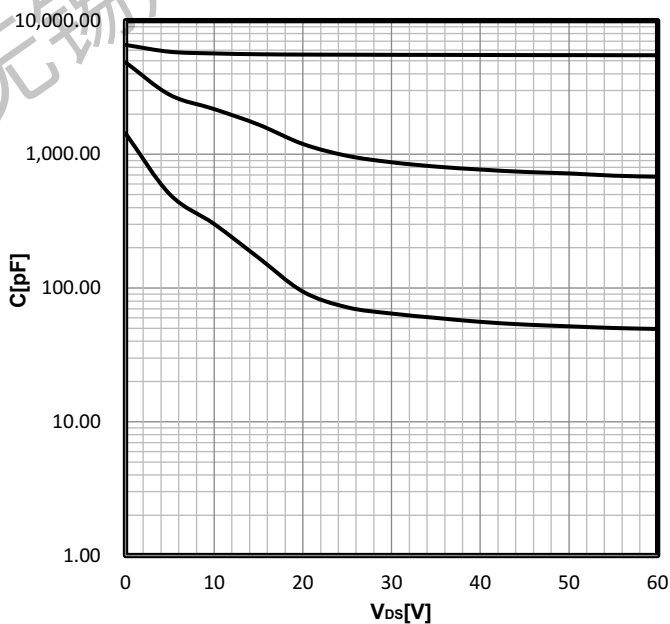
Typ. gate charge

$$V_{GS}=f(Q_{gate}); I_D=-15A$$



Typ. capacitances

$$C=f(V_{DS}); V_{GS}=0V; f=1MHz$$

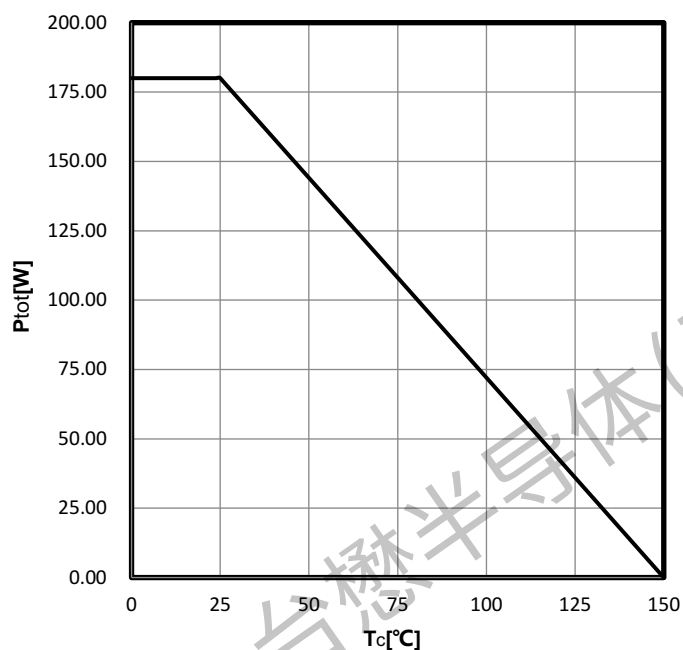


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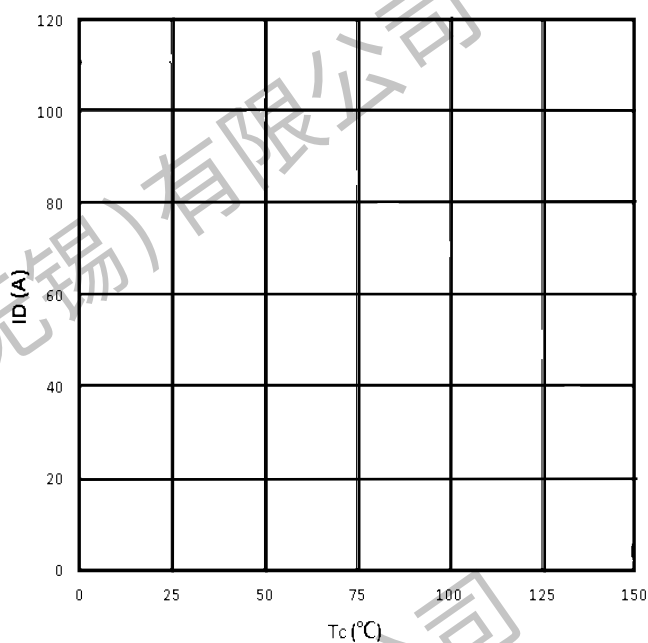
Power Dissipation

$$P_{tot}=f(T_C)$$



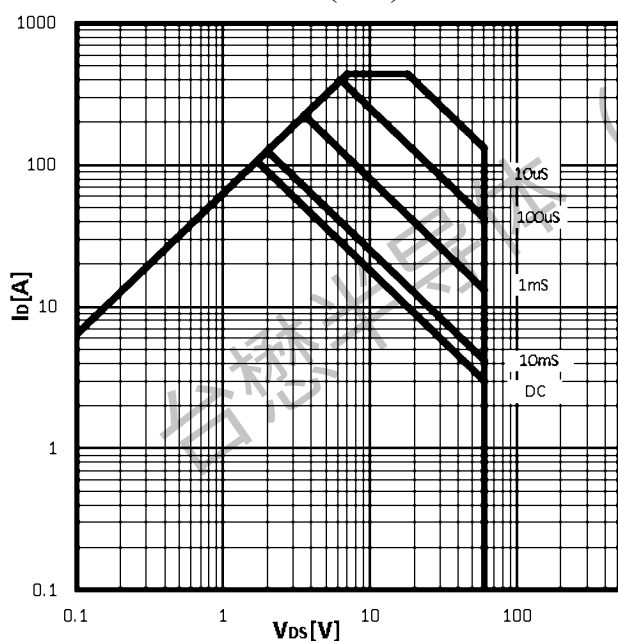
Maximum Drain Current

$$-I_D=f(T_C)$$



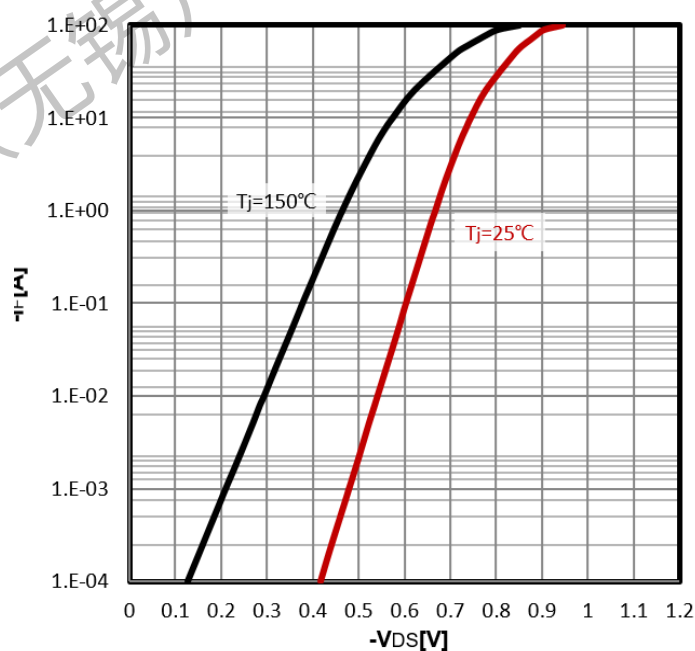
Safe operating area

$$I_D=f(V_{DS})$$



Body Diode Forward Voltage Variation

$$-I_F=f(-V_{DS})$$

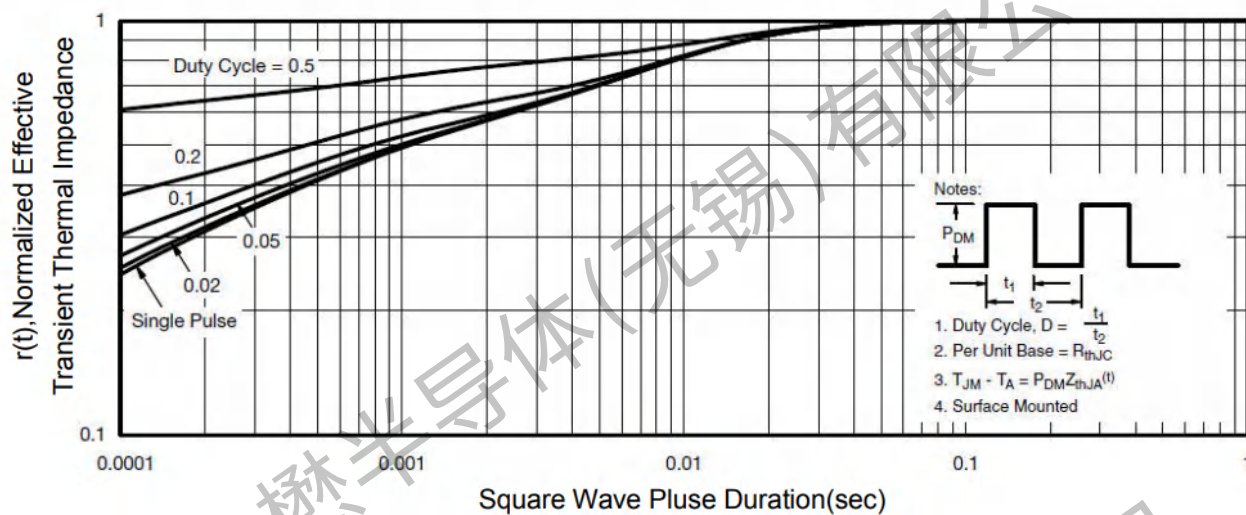


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Max. transient thermal impedance

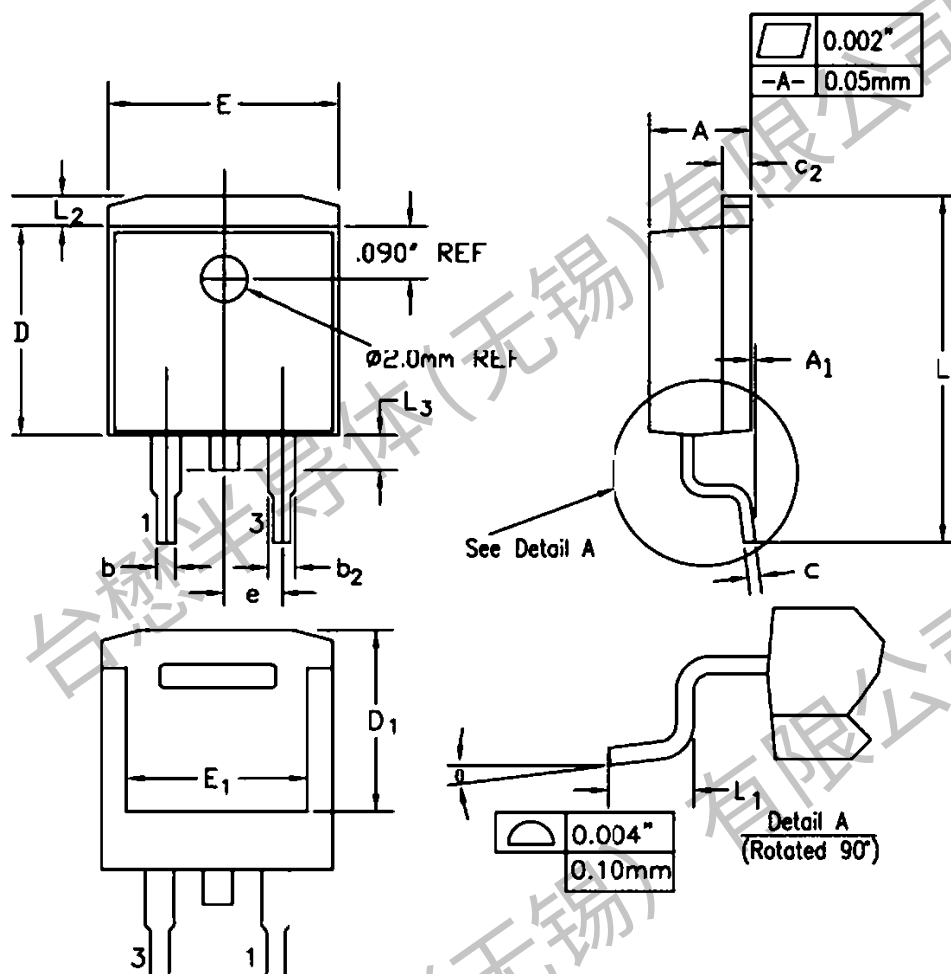
$$Z_{thJC}=f(t_p)$$



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Package Mechanical Data: TO-263-3L



SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.170	0.180	4.32	4.57	
A1	-	0.010	-	0.25	
b	0.028	0.037	0.71	0.94	
b2	0.045	0.055	1.15	1.40	
c	0.018	0.024	0.46	0.61	
c2	0.048	0.055	1.22	1.40	
D	0.350	0.370	8.89	9.40	
D1	0.315	0.324	8.01	8.23	
E	0.395	0.405	10.04	10.28	
E1	0.310	0.318	7.88	8.08	
e	0.100 BSC.		2.54 BSC.		
L	0.580	0.620	14.73	15.75	
L1	0.090	0.110	2.29	2.79	
L2	0.045	0.055	1.15	1.39	
L3	0.050	0.070	1.27	1.77	
θ	0°	8°	0°	8°	

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Revision history:

Date	Rev	Description	Page
2023.04.06	23.04	Original	