TM09N03MI

N-Channel Enhancement Mosfet

General Description

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

Applications

- Load switch
- PWM

General Features

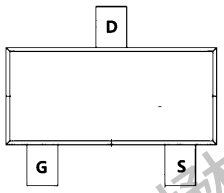
V_{DS} = 30V I_D =9 A

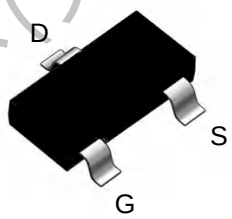
$R_{DS(ON)}$ = 9 mΩ(Typ.)@ V_{GS}=10V

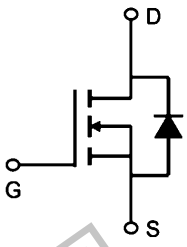
100% UIS Tested

100% R_g Tested

MI:SOT-23-3L







Marking:3012A

Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_A=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	9	A
I_D@T_A=100℃	Continuous Drain Current, V_{GS} @ 10V[1]	5.8	A
I_{DM}	Pulsed Drain Current[2]	30	A
E_{AS}	Single Pulse Avalanche Energy[3]	18	mJ
P_D@T_A=25℃	Total Power Dissipation[4]	1.5	W
T_{STG}	Storage Temperature Range	-55 to 175	℃
T_J	Operating Junction Temperature Range	-55 to 175	℃

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient [1]	---	48	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case	---	---	℃/W

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Electrical Characteristics: (T_A=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Sourtce Breakdown Voltage	V_{GS}=0V,I_D=250μA	30	---	---	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=150V , V_{GS}=0V	---	---	1	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V, V_{DS}=0V	---	---	±100	nA
On Characteristics[3]						
$V_{GS(th)}$	GATE-Source Threshold Voltage	V_{GS}=V_{DS}, I_D=250μA	0.9	1.2	1.5	V
$R_{DS(ON)}$	Static Drain-Source On Resistance[2]	V_{GS}=10V,I_D=8A	---	9	10	mΩ
		V_{GS}=4.5V,I_D=6A	---	12	18	
G_{FS}	Forward Transconductance	V_{DS}=5V, I_D=8A	---	24	---	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=15V, V_{GS}=0V, f=1MHz	---	940	1316	pF
C_{oss}	Output Capacitance		---	131	183	
C_{rss}	Reverse Transfer Capacitance		---	109	153	
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DS}=15V R_{GEN}=1.5Ω , V_{GS}=10V I_D=8A	---	4.2	8.4	ns
t_r	Rise Time		---	8.2	15	ns
$t_{d(off)}$	Turn-Off Delay Time		---	31	62	ns
t_f	Fall Time		---	4	8	ns
Q_g	Total Gate Charge	V_{GS}=4.5V, V_{DS}=15V, I_D=8A	---	9.63	13.5	nC
Q_{gs}	Gate-Source Charge		---	3.88	5.4	nC
Q_{gd}	Gate-Drain “Miller” Charge		---	3.44	4.8	nC
Drain-Source Diode Characteristics						
V_{SD}	Source-Drain Diode Forward Voltage[2]	V_{GS}=0V,I_S=1A,T_J=25℃	---	---	1	V
I_S	Continuous Source Current[1,5]	VG=VD=0V	---	---	9	A
I_{SM}	Pulsed Source Current[2,5]		---	---	30	
Trr	Body Diode Reverse Recovery Time	I_F=8A , dI/dt=100A/μs , T_J=25℃	---	8	---	Ns
Qrr	Body Diode Reverse Recovery Charge		---	2.9	---	Nc

Notes:
1.The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.
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}=22A
4.The power dissipation is limited by 150℃ 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.

Typical Characteristics：

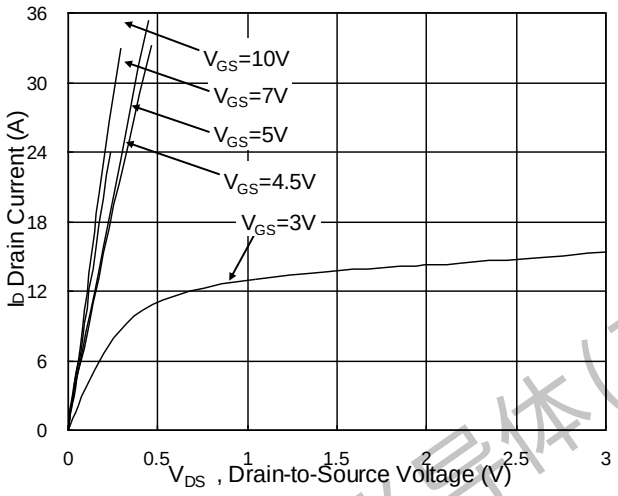


Fig.1 Typical Output Characteristics

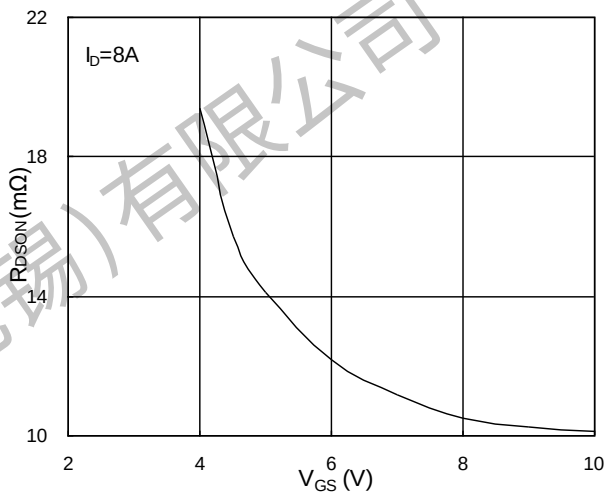
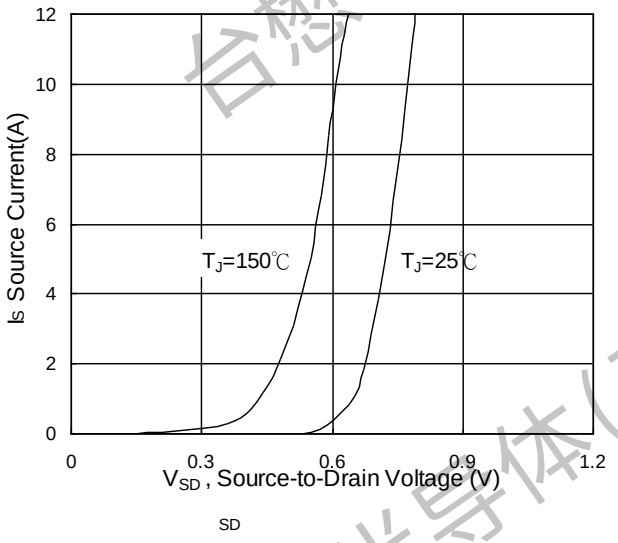


Fig.2 On-Resistance vs. G-S Voltage



SD

Fig.3 Forward Characteristics of Reverse

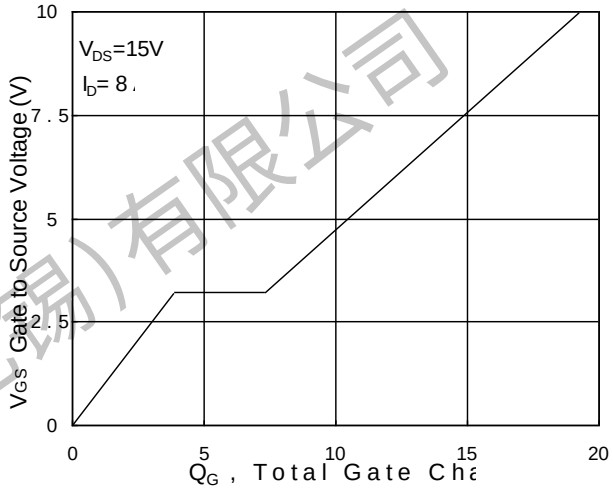


Fig.4 Gate-Charge Characteristics

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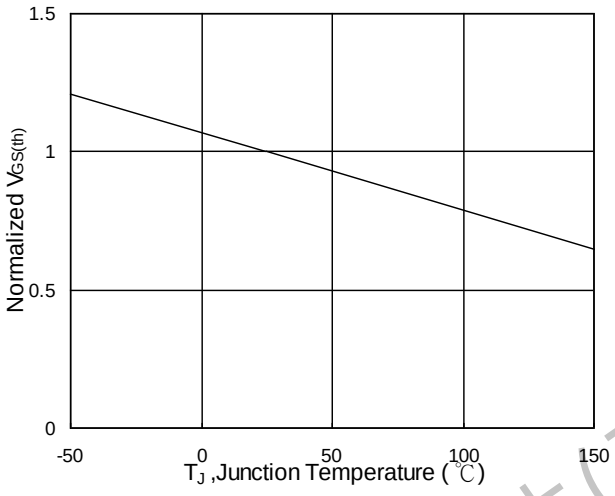


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

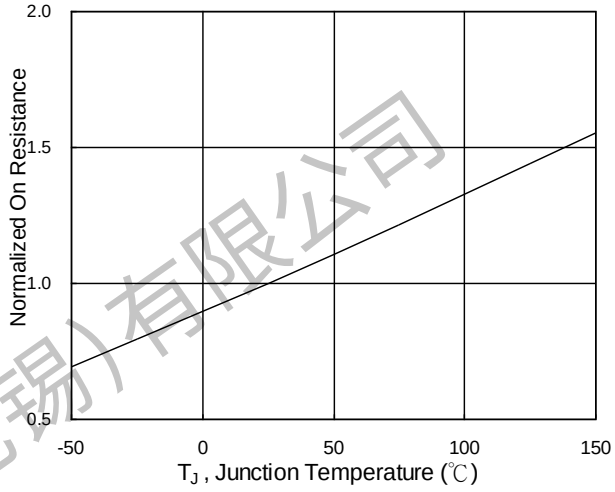


Fig.6 Normalized R_{DSON} vs. T_J

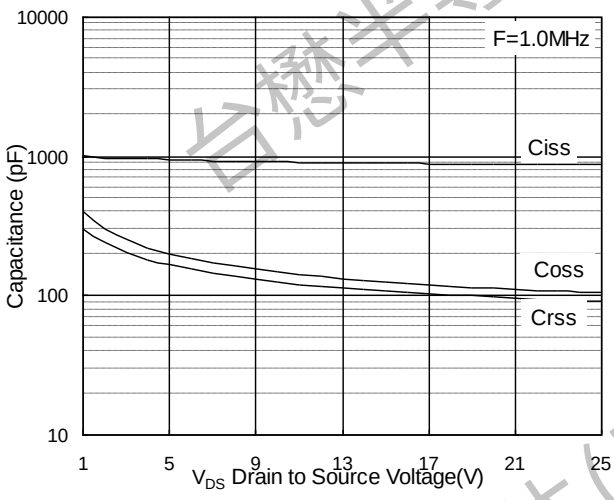


Fig.7 Capacitance

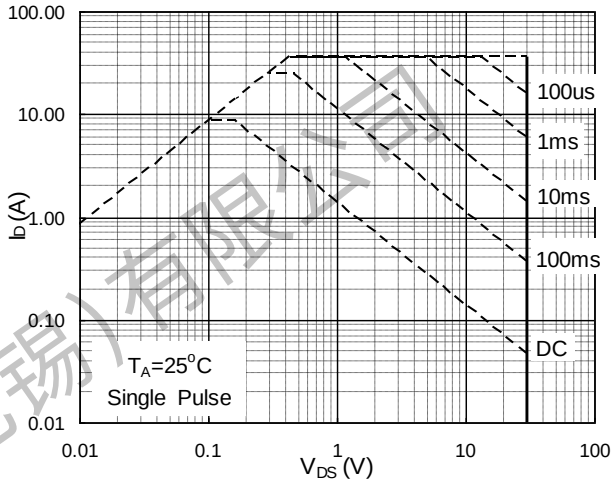


Fig.8 Safe Operating Area

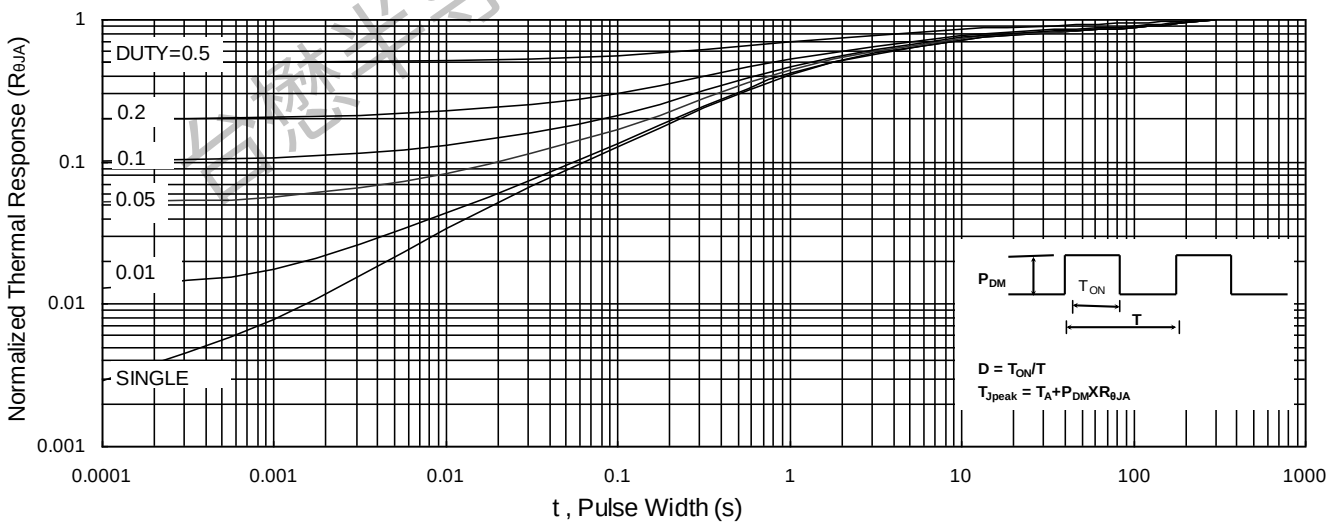
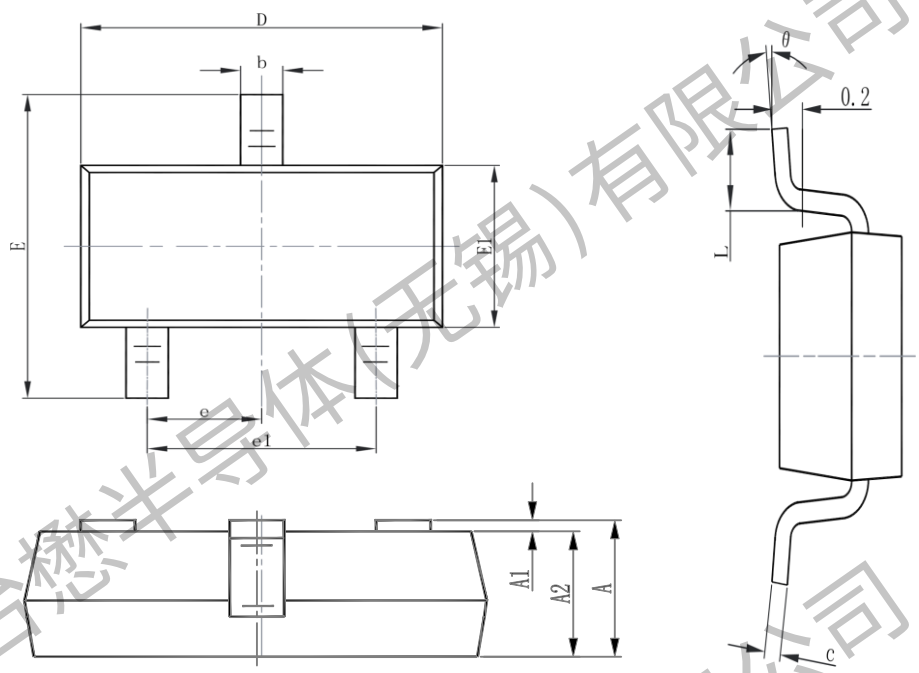


Fig.9 Normalized Maximum Transient Thermal Impedance

Package Mechanical Data:SOT-23-3L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

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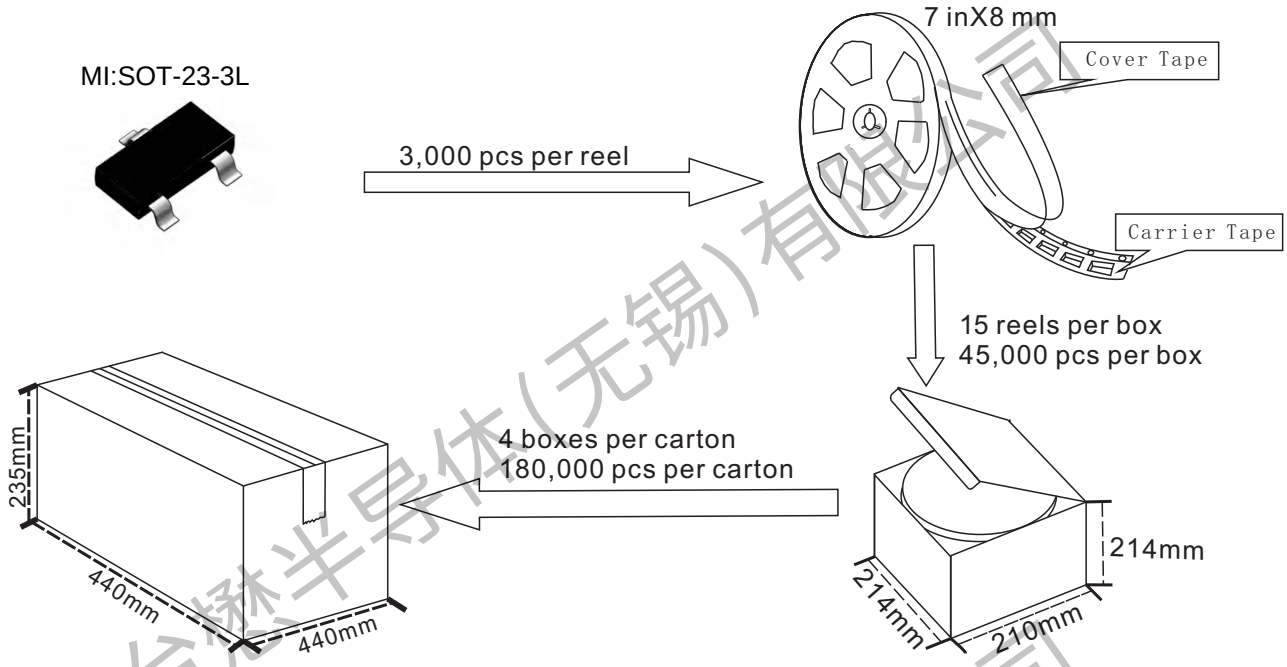
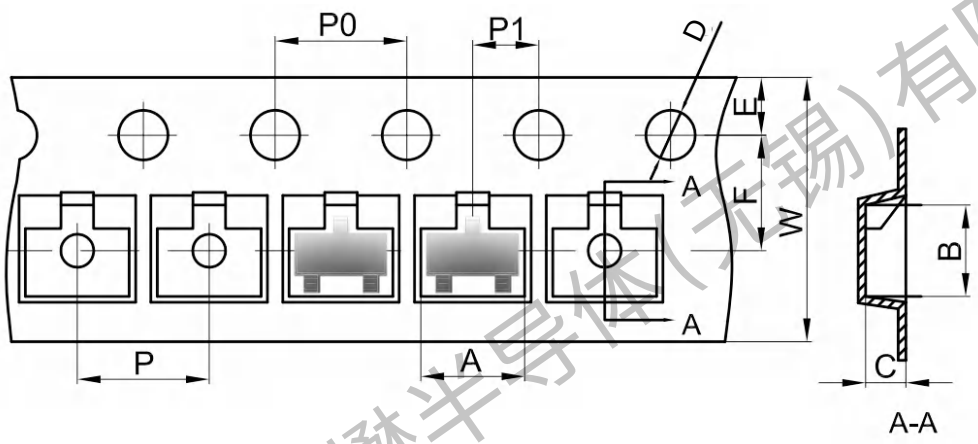
SOT-23-3L Packing

1.The method of packaging and dimension are shown as below figure. (Dimension in mm)

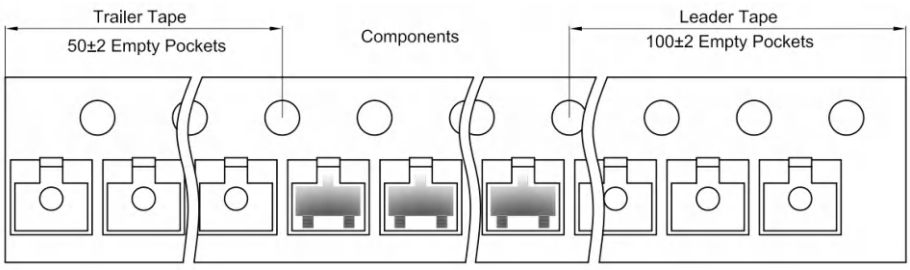


SOT-23-3L Embossed Carrier Tape



Dimensions are in millimeter										
Pkg type	A	B	C	D	E	F	P0	P	P1	W
SOT-23-3L	3.15	2.77	1.22	Ø1.50	1.75	3.50	4.00	4.00	2.00	8.00

SOT-23-3L Tape Leader and Trailer



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Revision history:

Date	Rev	Description	Page
2023.08.03	23.08	Original	