



TM09P03MI

P-Channel Enhancement Mosfet

General Description

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

Applications

- Load switch
- PWM

General Features

$V_{DS} = -30V$ $I_D = -8.8A$

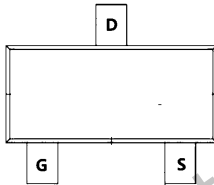
$R_{DS(ON)} = 20m\Omega (typ.) @ V_{GS} = -10V$

100% UIS Tested

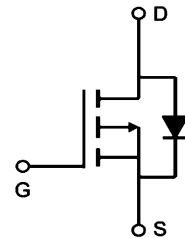
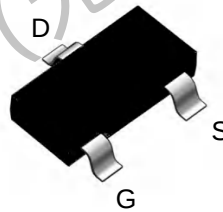
100% R_g Tested



MI:SOT-23-3L



Marking: 30P09



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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-30	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-8.8	A
$I_D @ T_A = 100^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^1$	-5.0	A
I_{DM}	Pulsed Drain Current ²	-36	A
E_{AS}	Single Pulsed Avalanche Energy ^{note2}	25	mJ
$P_D @ T_A = 25^\circ C$	Total Power Dissipation ³	3	W
T_{STG}	Storage Temperature Range	-55 to 175	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 175	$^\circ C$

Thermal Data

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

TM09P03MI
P-Channel Enhancement Mosfet
Electrical Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D = -250μA	-30	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -30V, V _{GS} = 0V,	-	-	-1	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} = ±20V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = -250μA	-1.0	-1.5	-2.0	V
R _{DS(on)}	Static Drain-Source on-Resistance Note3	V _{GS} =-10V, I _D =-9A	-	20	25	mΩ
		V _{GS} =-4.5V, I _D =-5A	-	26	33	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = -15V, V _{GS} = 0V, f = 1.0MHz	-	900	-	pF
C _{OSS}	Output Capacitance		-	125	-	pF
C _{rSS}	Reverse Transfer Capacitance		-	109	-	pF
Q _g	Total Gate Charge	V _{DS} = -15V, I _D = -8A, V _{GS} = -10V	-	42	-	nC
Q _{gs}	Gate-Source Charge		-	8.8	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	7.3	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} = -15V, I _D = -1A, V _{GS} =-10V, R _{GEN} =6Ω	-	13	-	ns
t _r	Turn-on Rise Time		-	15	-	ns
t _{d(off)}	Turn-off Delay Time		-	198	-	ns
t _f	Turn-off Fall Time		-	98	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-8.8	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-36	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0V, I _S = -9A	-	-0.8	-1.2	V

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

 2. EAS condition: $T_J=25^{\circ}\text{C}$, $V_{DD}=-15V$, $V_G=-10V$, $R_G=25\Omega$, $L=0.5mH$, $I_{AS}=-10A$

 3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

Typical Performance Characteristics

Figure 1: Output Characteristics

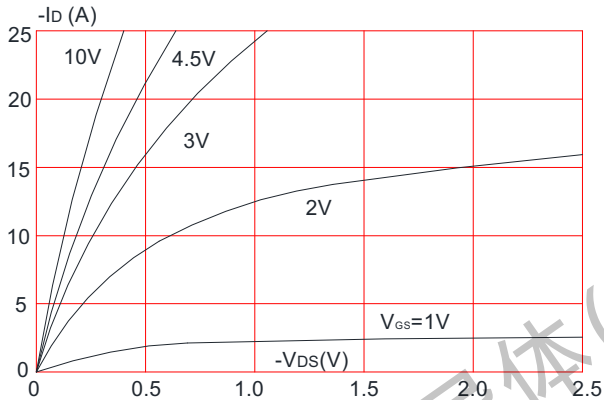


Figure 2: Typical Transfer Characteristics

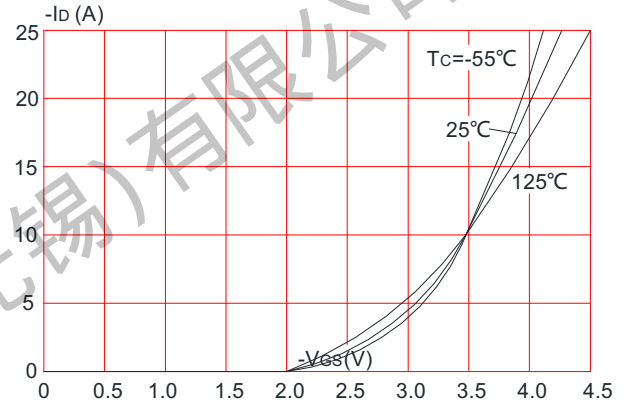


Figure 3: On-resistance vs. Drain Current

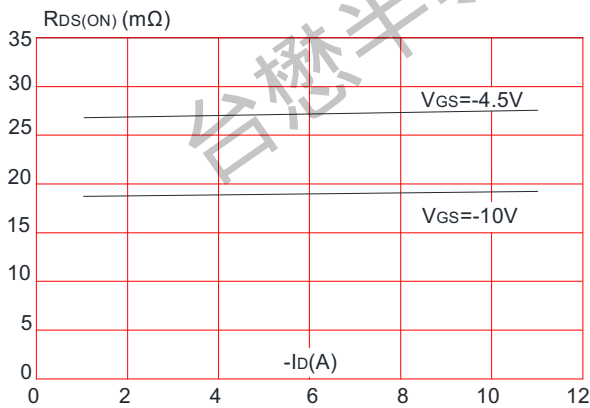


Figure 4: Body Diode Characteristics

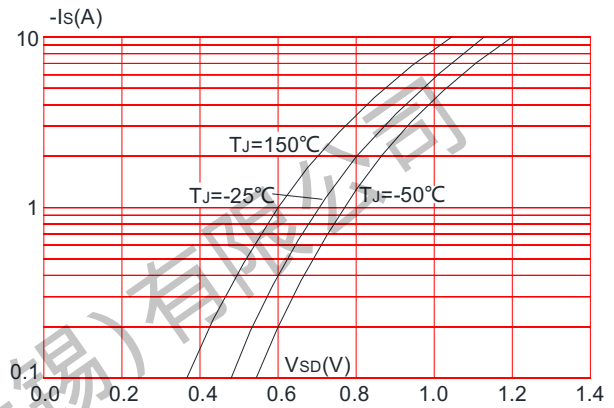


Figure 5: Gate Charge Characteristics

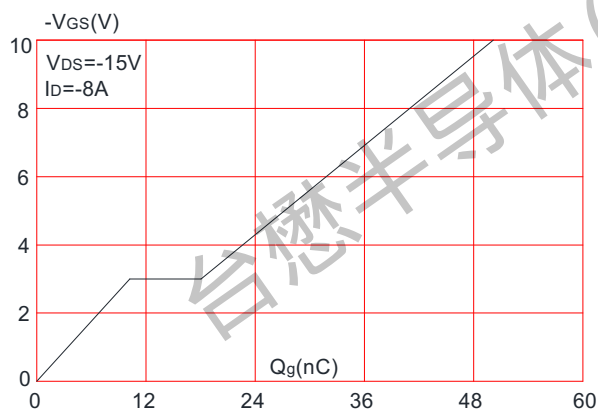
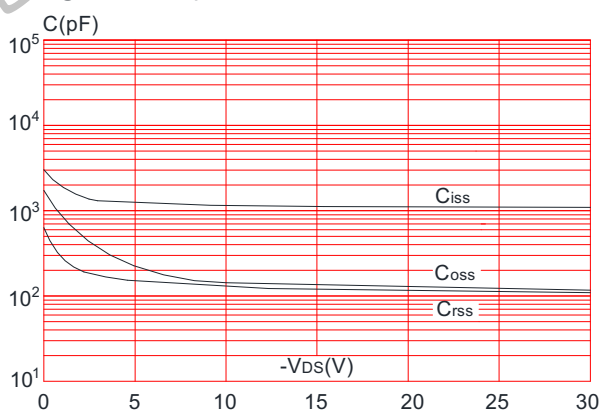


Figure 6: Capacitance Characteristics



TM09P03MI

P-Channel Enhancement Mosfet

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

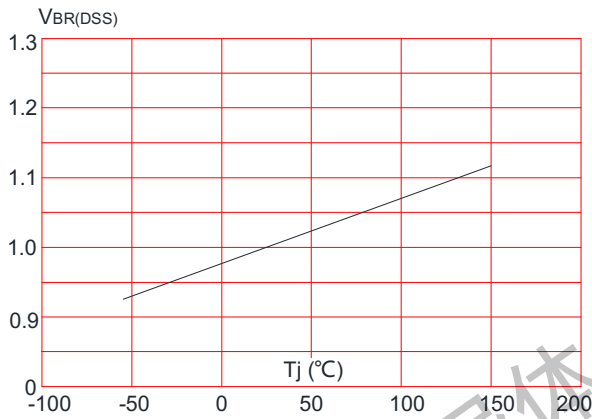


Figure 8: Normalized on Resistance vs. Junction Temperature

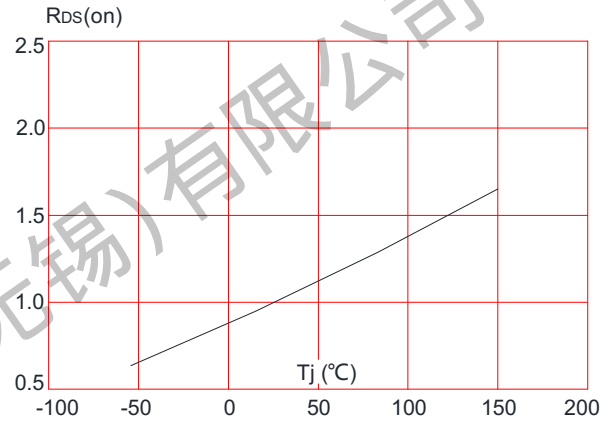


Figure 9: Maximum Safe Operating Area

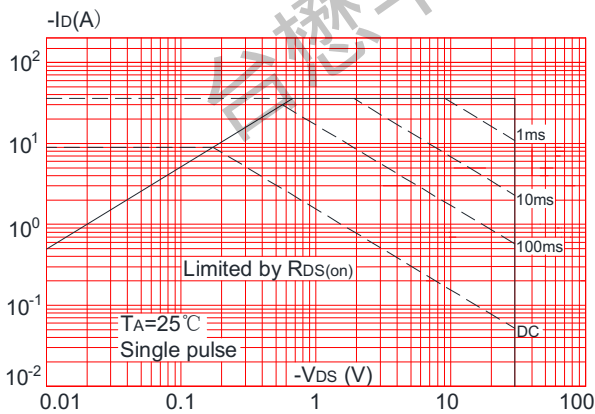


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

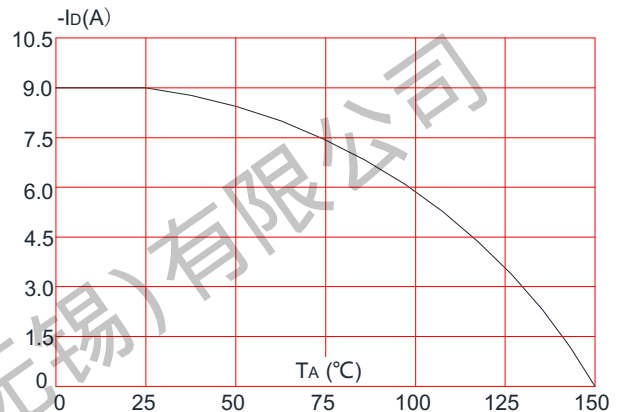
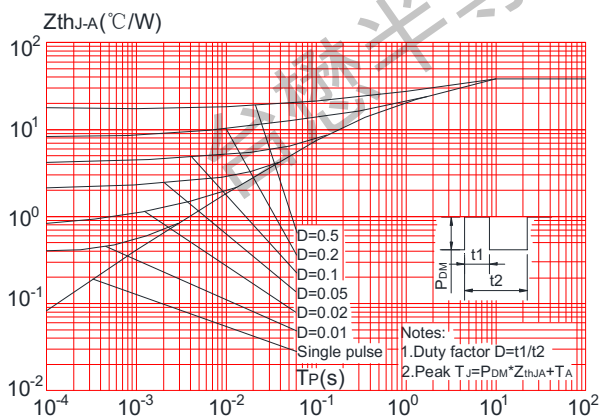


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

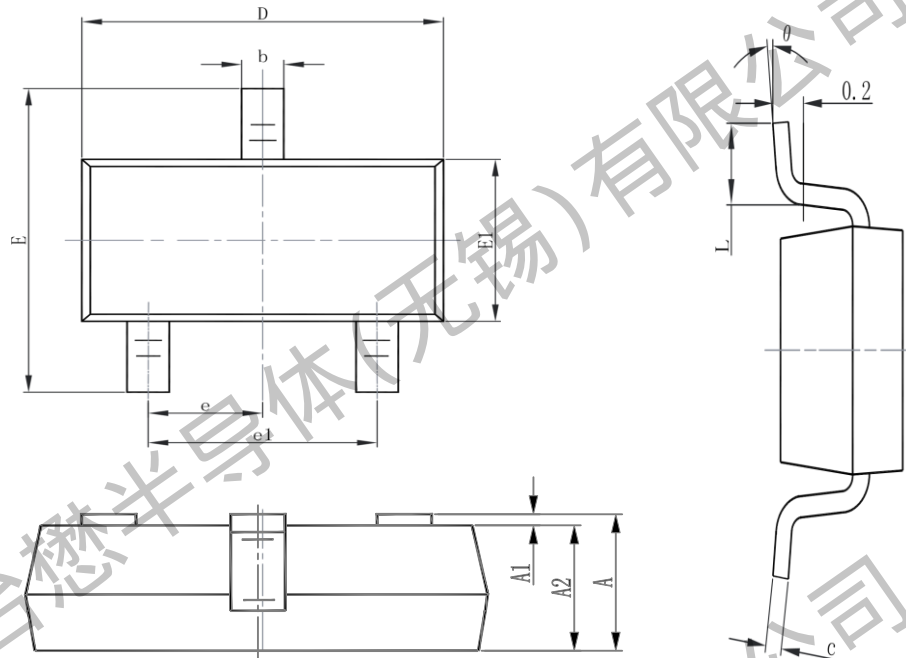




TM09P03MI

P-Channel Enhancement Mosfet

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°

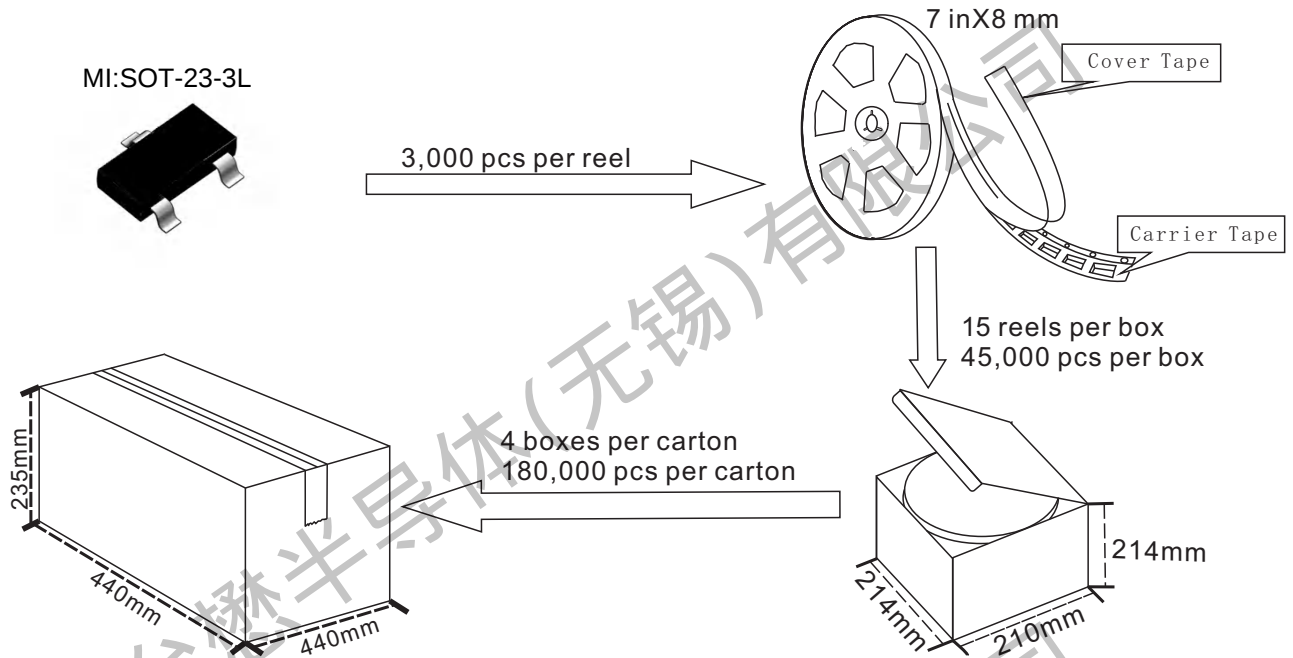


TM09P03MI

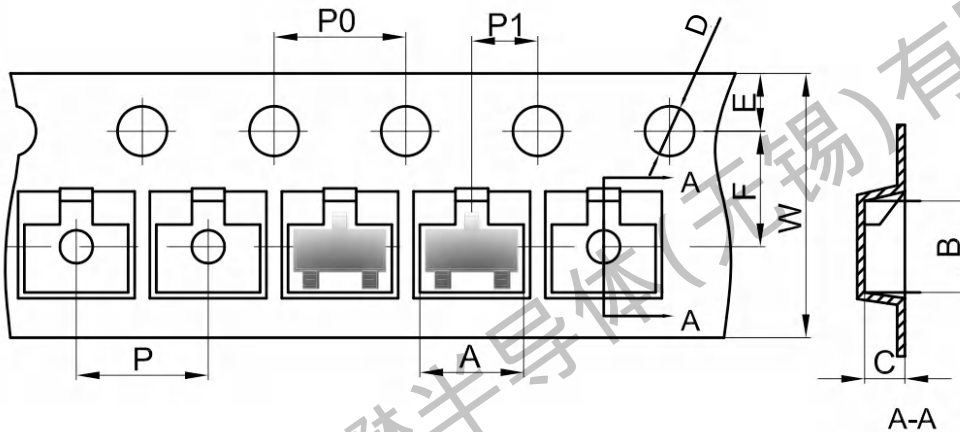
P-Channel Enhancement Mosfet

SOT-23 Packing

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



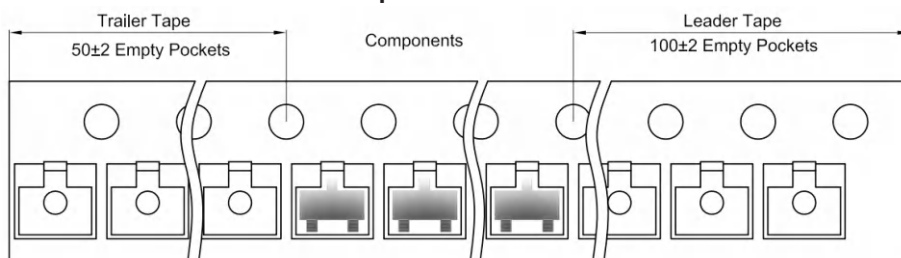
SOT-23-3L Embossed Carrier Tape



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



Important Notices and Disclaimers

- Tritech-MOS Technology Corp. reserves the right to change this document, its products, and specifications at any time without prior notice.
- Before final design, purchase, or use, customers should obtain and confirm the latest product information and specifications.
- Tritech-MOS Technology Corp. makes no warranties, representations or warranties regarding the suitability of its products for any specific purpose, and Tritech-MOS Technology Corp. does not assume any responsibility for application assistance or customer product design.
- Tritech-MOS Technology Corp. does not guarantee or assume any responsibility for the purchase or use of any unexpected or unauthorized products.
- Any intellectual property rights of Tritech-MOS Technology Corp. are not licensed through implicate or other means.
- Products of Tritech-MOS Technology Corp. are not included as critical components in life support equipment or systems without explicit written approval from Tritech-MOS Technology Corp.

Revision history:

Date	Rev	Description	Page
2023.05.09	23.05	Original	