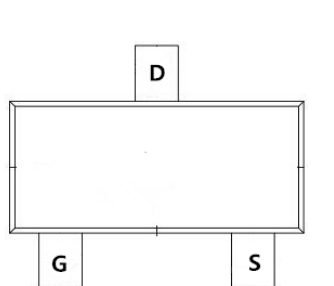


TM09P02MI

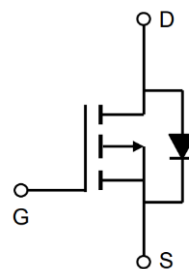
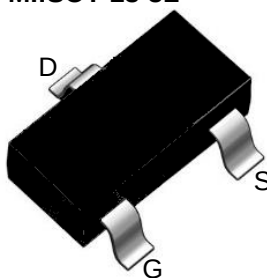
P-Channel Enhancement Mosfet

General Description • Low $R_{DS(ON)}$ • RoHS and Halogen-Free Compliant Applications • Load switch • PWM	General Features $V_{DS} = -20V$ $I_D = -9.0A$ $R_{DS(ON)} = 15m\Omega (typ.) @ V_{GS} = -4.5V$ 100% UIS Tested 100% R_g Tested 
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Marking: 20P09 OR 09P02

MI:SOT-23-3L



Absolute Maximum Ratings (TC=25°C unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-20V	V
V_{GS}	Gate-Source Voltage	± 12	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	-9	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	-5.8	A
I_{DM}	Pulsed Drain Current ²	-34	A
$P_D @ T_A = 25^\circ C$	Total Power Dissipation ³	2.5	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-ambient (steady state) ¹	62.5	$^\circ C/W$
	Thermal Resistance Junction-ambient ($t < 10s$) ¹	35	$^\circ C/W$



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P-Channel Enhancement Mosfet

Electrical Characteristics (T_J=25°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		-20		V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -20V, V _{GS} =0V,	-	-	-1	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} = ±12V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D = -250μA	-0.4	-0.7	-1.0	V
R _{DS(on)}	Static Drain-Source on-Resistance note2	V _{GS} = -4.5V, I _D = -7A	-	15	20	mΩ
		V _{GS} = -2.5V, I _D = -5A	-	21	24	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = -10V, V _{GS} =0V, f=1.0MHz	-	1400	-	pF
C _{oss}	Output Capacitance		-	242	-	pF
C _{rss}	Reverse Transfer Capacitance		-	231	-	pF
Q _g	Total Gate Charge	V _{DS} = -10V, I _D = -3A, V _{GS} = -4.5V	-	15.3	-	nC
Q _{gs}	Gate-Source Charge		-	2.2	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	4.4	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} = -10V, I _D = -7A, V _{GS} = -4.5V, R _{GEN} =2.5Ω	-	10	-	ns
t _r	Turn-on Rise Time		-	31	-	ns
t _{d(off)}	Turn-off Delay Time		-	28	-	ns
t _f	Turn-off Fall Time		-	8	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-9	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-34	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S = -7A	-	-0.8	-1.2	V

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

2. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

Typical Performance Characteristics

Figure1: Output Characteristics

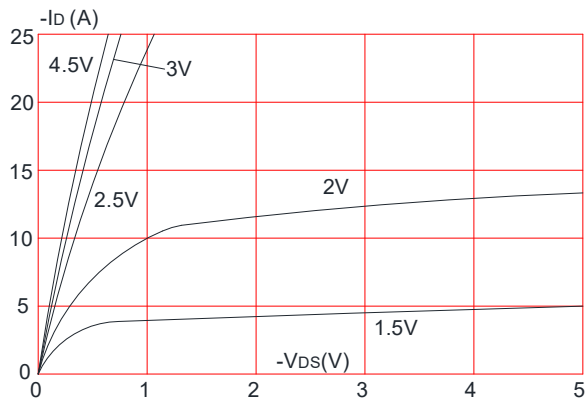


Figure 2: Typical Transfer Characteristics

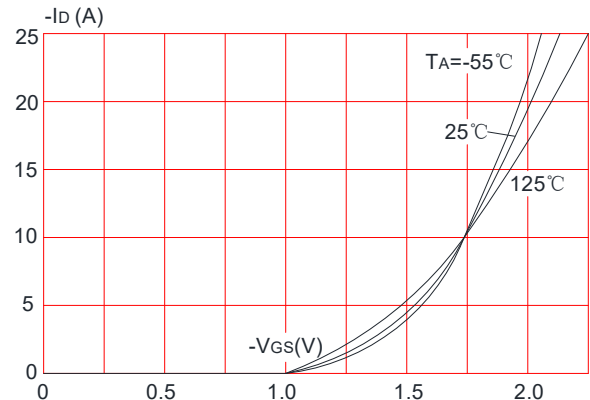


Figure 3: On-resistance vs. Drain Current

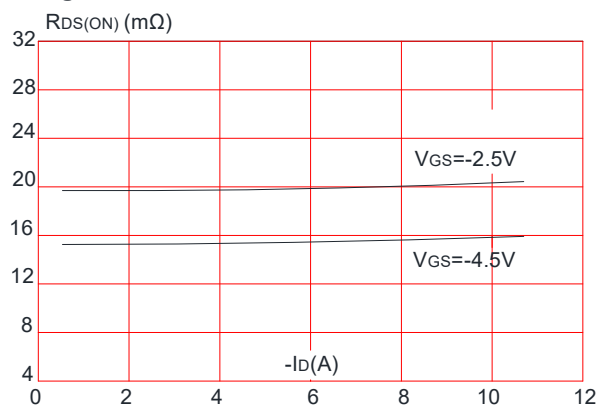


Figure 4: Body Diode Characteristics

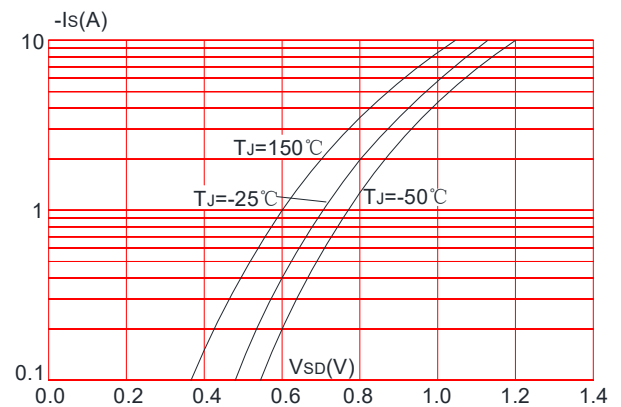


Figure 5: Gate Charge Characteristics

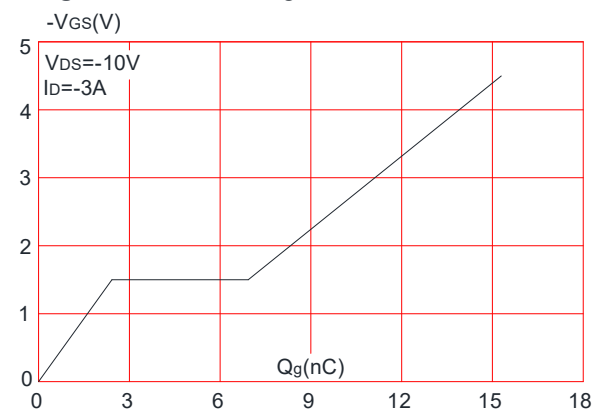
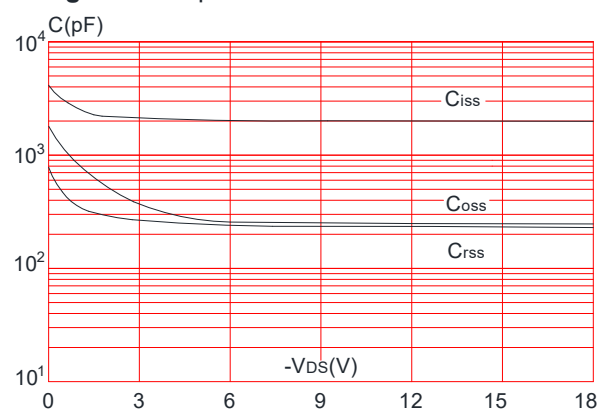


Figure 6: Capacitance Characteristics





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P-Channel Enhancement Mosfet

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

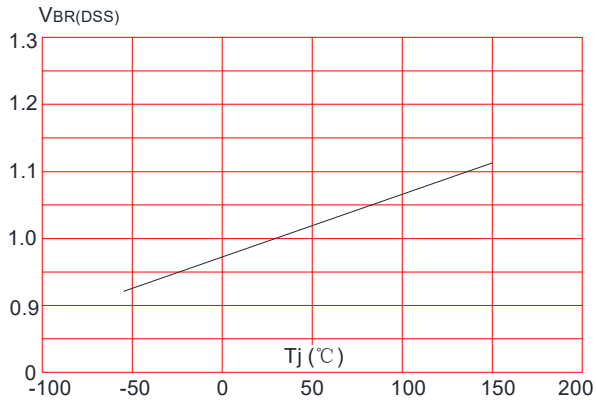


Figure 8: Normalized on Resistance vs. Junction Temperature

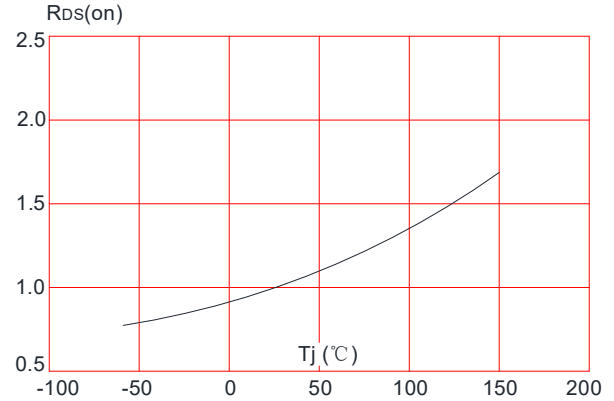


Figure 9: Maximum Safe Operating Area

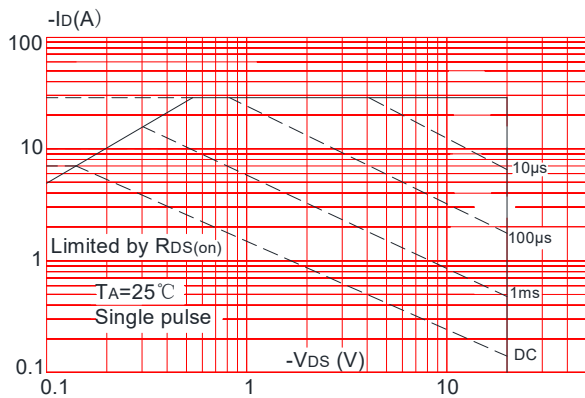


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

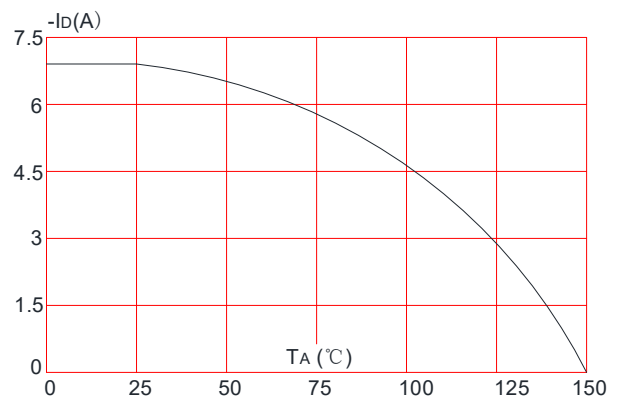
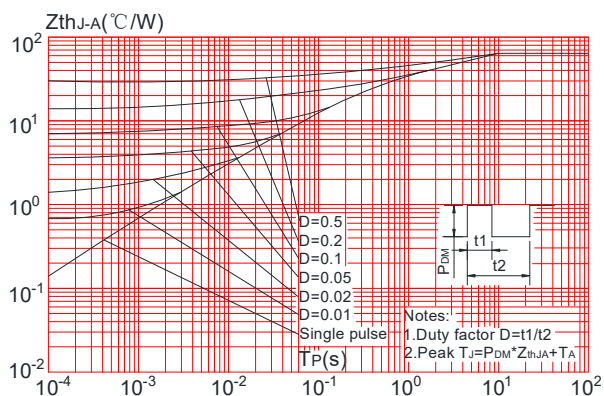
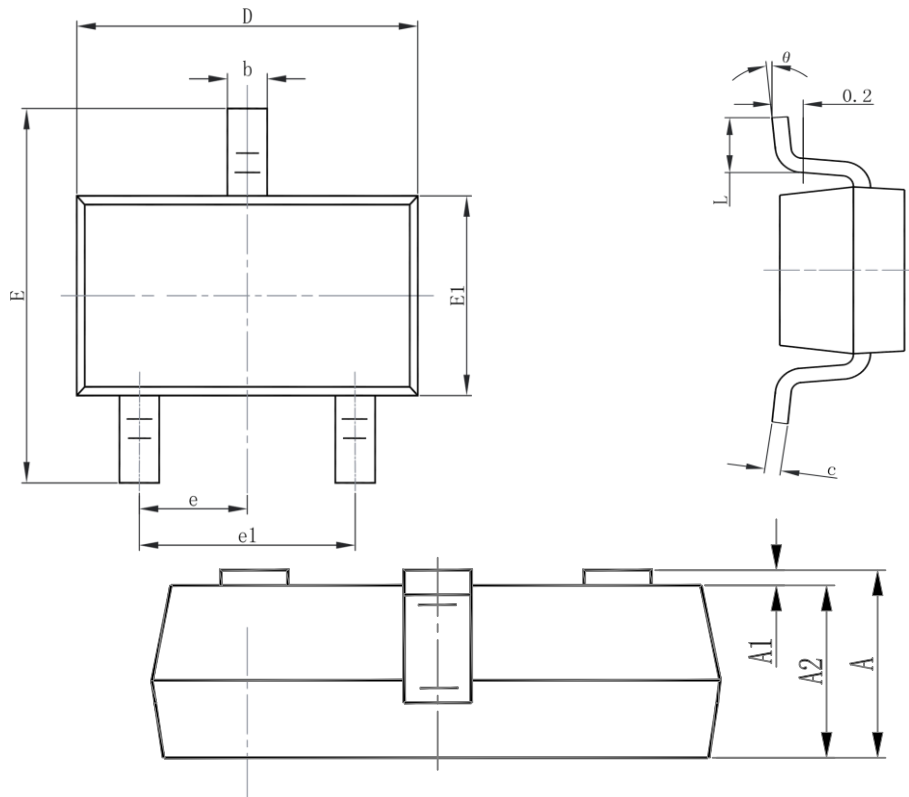


Figure 11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



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°