TM05P04MI P-Channel Enhancement Mosfet

General Description

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

Applications

- Load switch
- PWM

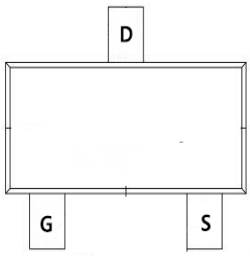
General Features

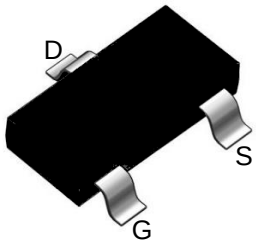
V_{DS} = -40V I_D =-5.4A

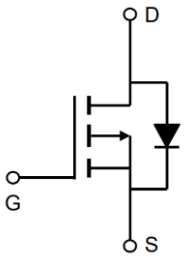
$R_{DS(ON)}$ = 45mΩ(typ.)@ V_{GS}=-10V

100% UIS Tested
100% R_g Tested

MI:SOT-23-3L







Marking: 5P04

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-40	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_A=25℃	Continuous Drain Current	-5.4	A
I_D@T_A=70℃	Continuous Drain Current	-3.7	A
I_{DM}	Pulsed Drain Current[2]	-24	A
P_D@T_A=25℃	Total Power Dissipation[3]	2.0	W
P_D@T_A=70℃	Total Power Dissipation[3]	1.5	W
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	---	65	℃/W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1] (t ≤10s)	---	48	℃/W

Electrical Characteristics (T_J=25℃ 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	-40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}= -40V, 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	-1.7	-2.5	V
$R_{DS(on)}$	Static Drain-Source on-Resistance Note2	V_{GS}= -10V, I_D= -5A	-	45	54	mΩ
		V_{GS}= -4.5V, I_D= -4A	-	55	68	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}= -20V, V_{GS}=0V, f=1.0MHz	-	899	-	pF
C_{oss}	Output Capacitance		-	94	-	pF
C_{rss}	Reverse Transfer Capacitance		-	69	-	pF
Q_g	Total Gate Charge	V_{DS}= -20V, I_D= -4A, V_{GS}= -10V	-	17.3	-	nC
Q_{gs}	Gate-Source Charge		-	3.2	-	nC
Q_{gd}	Gate-Drain(“Miller”) Charge		-	4.3	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DS}= -20V, I_D= -4A, V_{GS}= -10V, R_{GEN}=3Ω	-	10.3	-	ns
t_r	Turn-on Rise Time		-	4.3	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	39	-	ns
t_f	Turn-off Fall Time		-	46.5	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-5.4	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-22	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS}=0V, I_S= -5.5A	-	-0.8	-1.2	V
trr	Reverse Recovery Time	V_{GS}=0V, I_S= -5.5A, di/dt=100A/μs	-	17	-	ns
Qrr	Reverse Recovery Charge		-	11.5	-	nC

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

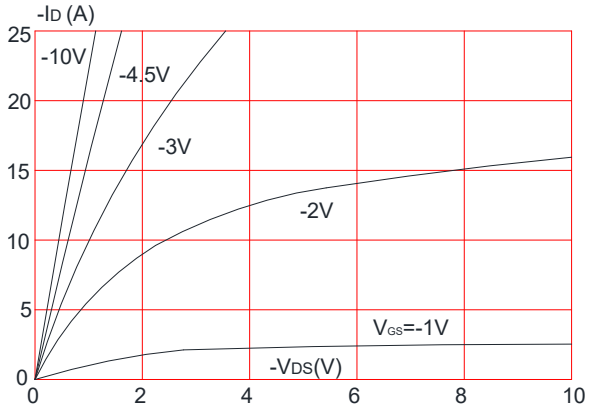


Figure 2: Typical Transfer Characteristics

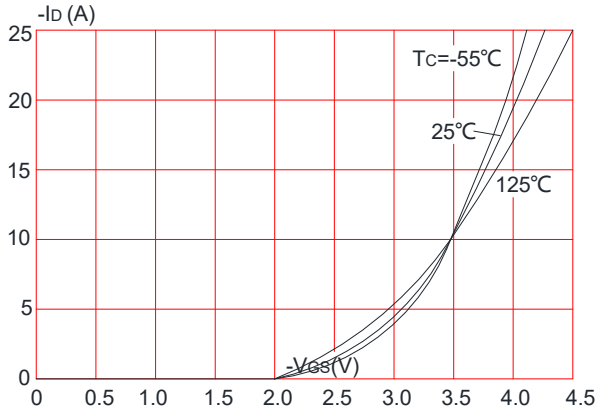


Figure 3: On-resistance vs. Drain Current

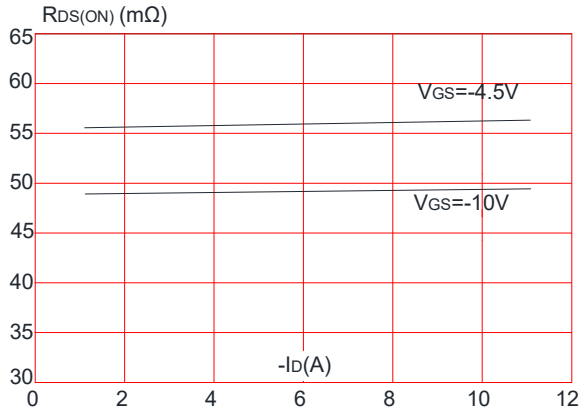


Figure 4: Body Diode Characteristics

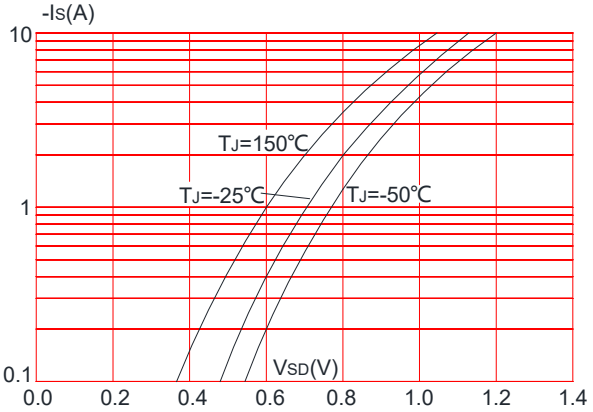


Figure 5: Gate Charge Characteristics

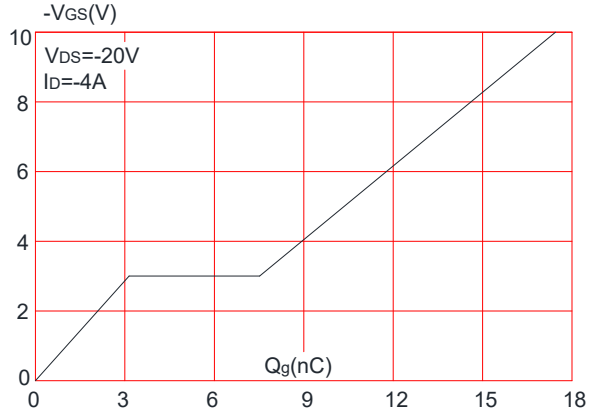


Figure 6: Capacitance Characteristics

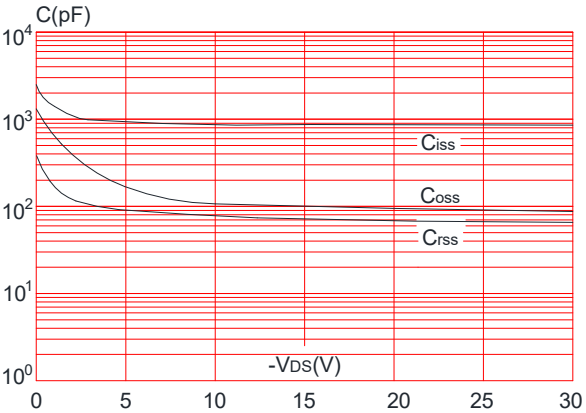


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

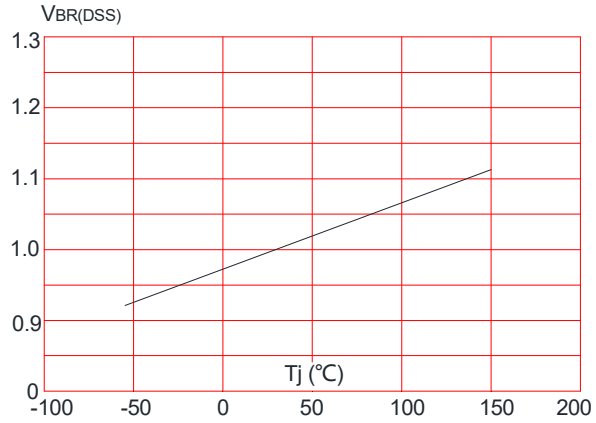


Figure 8: Normalized on Resistance vs. Junction Temperature

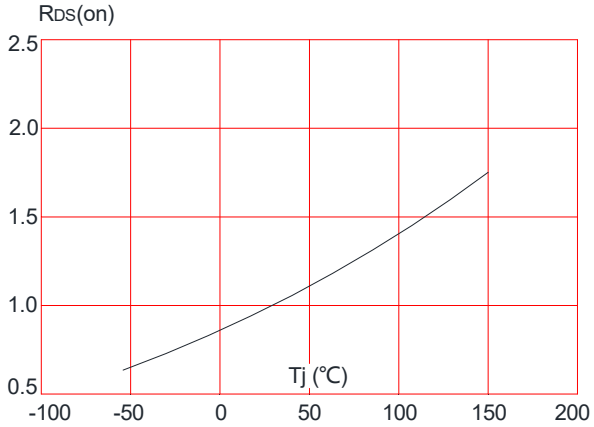


Figure 9: Maximum Safe Operating Area

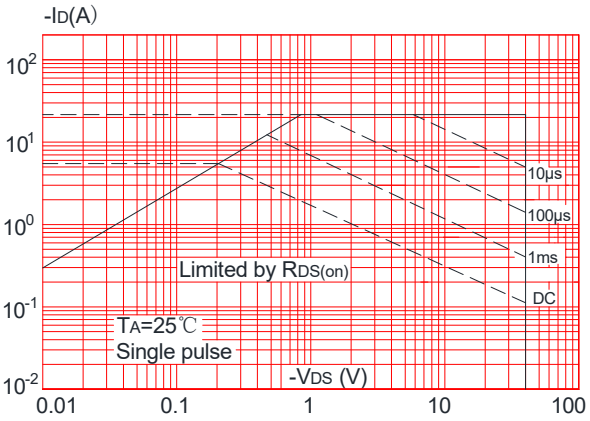


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

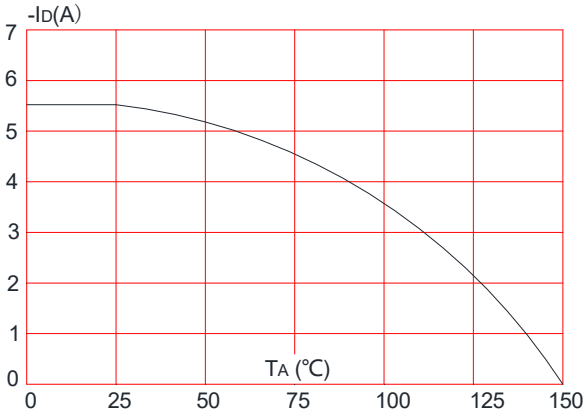
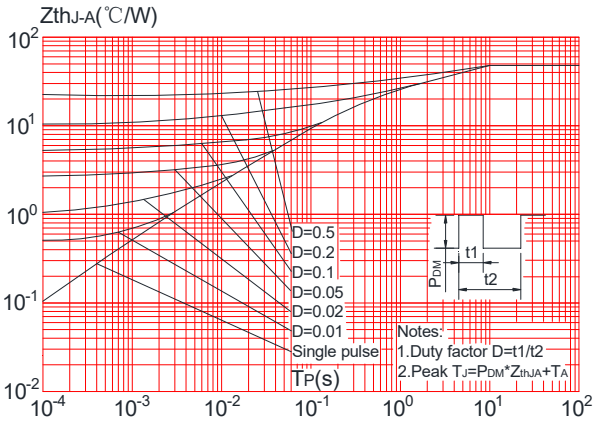
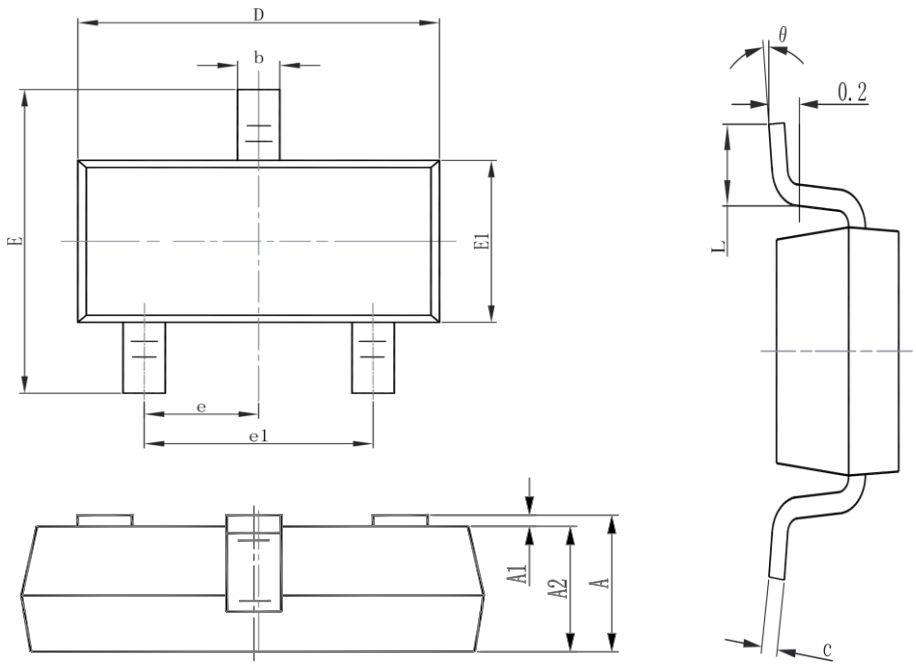


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



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°