

TM04N15MI

N-Channel Enhancement Mosfet

General Description

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

Applications

- Load switch
- PWM

General Features

$V_{DS} = 150V$ $I_D = 4.0A$

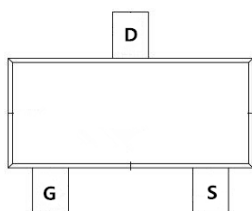
$R_{DS(ON)} = 180\text{ m}\Omega(\text{Typ.})@ V_{GS}=10V$

100% UIS Tested

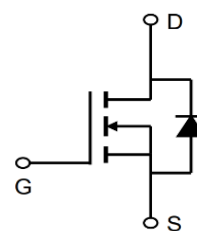
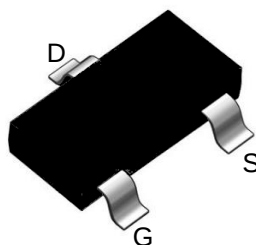
100% R_g Tested



MI:SOT-23-3L



Marking: 04N15 OR 3N150



Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$, unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	150	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current	$T_C=25^\circ\text{C}$	I_D	4.0	A
	$T_C=100^\circ\text{C}$		2.4	
Pulsed Drain Current ¹		I_{DM}	25	A
Single Pulse Avalanche Energy ²		E_{AS}	1.25	mJ
Total Power Dissipation	$T_C=25^\circ\text{C}$	P_D	3	W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction-to-Ambient ³	$R_{\theta JA}$	85	$^\circ\text{C/W}$

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N-Channel Enhancement Mosfet
Electrical Characteristics ($T_J = 25^\circ\text{C}$, unless otherwise noted)

Parameter		Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics							
Drain-Source Breakdown Voltage		V _{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	150	-	-	V
Gate-body Leakage current		I _{GSS}	V _{DS} = 0V, V _{GS} = ±20V	-	-	±100	nA
Zero Gate Voltage Drain Current	T _J =25°C	I _{DSS}	V _{DS} = 150V, V _{GS} = 0V	-	-	1	μA
	T _J =100°C			-	-	100	
Gate-Threshold Voltage		V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	0.5	1.5	2.5	V
Drain-Source on-Resistance ⁴		R _{DS(on)}	V _{GS} = 10V, I _D = 4A	-	180	220	mΩ
Forward Transconductance ⁴		g _{fs}	V _{DS} = 10V, I _D = 4A	-	25	-	S
Dynamic Characteristics ⁵							
Input Capacitance		C _{iss}	V _{DS} = 75V, V _{GS} =0V, f =1MHz	-	450	-	pF
Output Capacitance		C _{oss}		-	23	-	
Reverse Transfer Capacitance		C _{rss}		-	14	-	
Gate Resistance		R _g	f =1MHz	-	1.5	-	Ω
Switching Characteristics ⁵							
Total Gate Charge		Q _g	V _{GS} = 10V,V _{DS} = 75V, I _D =1.5A	-	8.2	-	nC
Gate-Source Charge		Q _{gs}		-	1.5	-	
Gate-Drain Charge		Q _{gd}		-	2.2	-	
Turn-on Delay Time		t _{d(on)}	V _{GS} =10V, V _{DD} =75V, R _G = 6Ω, I _D = 1A,R _G = 75Ω	-	8.2	-	ns
Rise Time		t _r		-	10.2	-	
Turn-off Delay Time		t _{d(off)}		-	20.5	-	
Fall Time		t _f		-	15.3	-	
Drain-Source Body Diode Characteristics							
Diode Forward Voltage ⁴		V _{SD}	I _S = 1A, V _{GS} = 0V	-	-	1.2	V
Continuous Source Current	T _C =25°C	I _S	-	-	-	4.0	A

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)} = 150^\circ\text{C}$.
2. The EAS data shows Max. rating . The test condition is $V_{DD} = 25V, V_{GS} = 10V, L = 0.1mH, I_{AS} = 5A$.
3. The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
5. This value is guaranteed by design hence it is not included in the production test.

Typical Characteristics

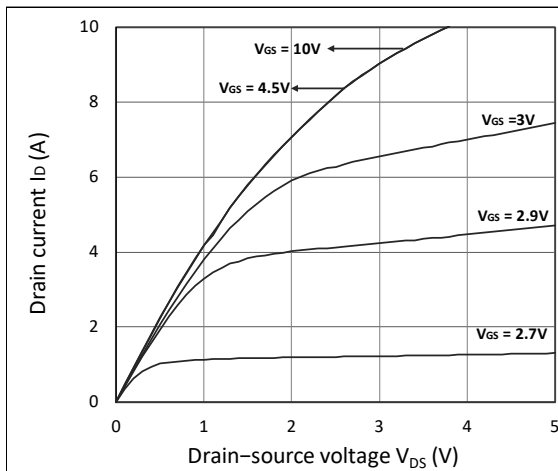


Figure 1. Output Characteristics

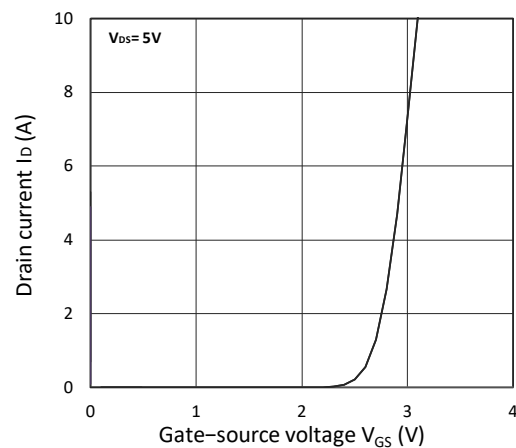


Figure 2. Transfer Characteristics

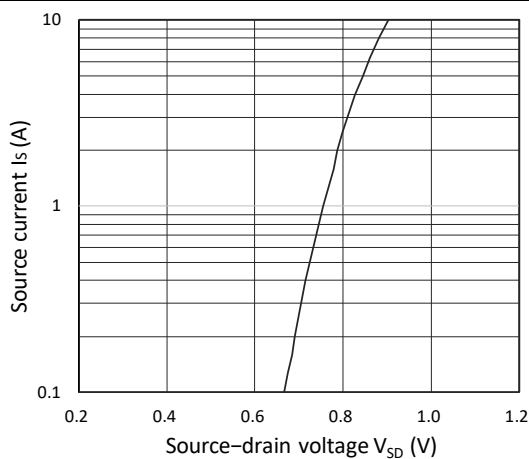


Figure 3. Forward Characteristics of Reverse

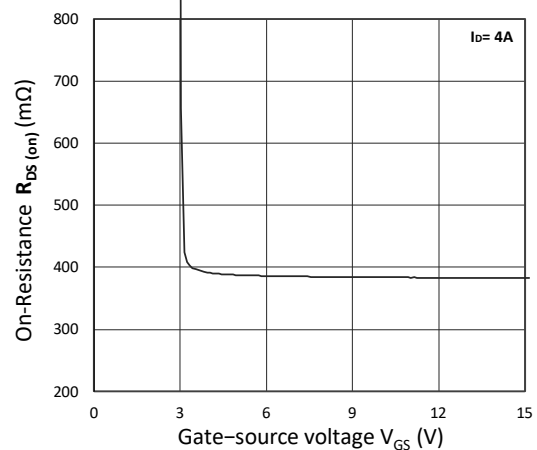


Figure 4. $R_{DS(on)}$ vs. V_{GS}

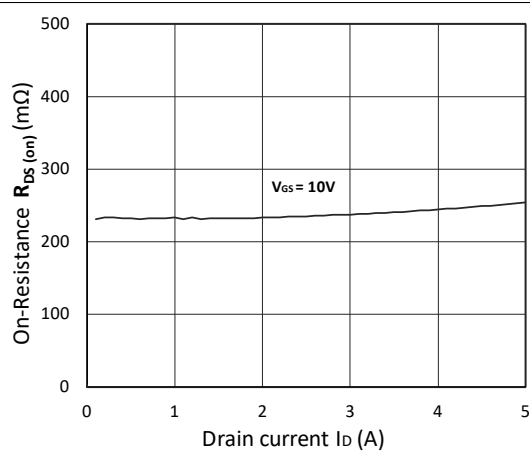


Figure 5. $R_{DS(on)}$ vs. I_D

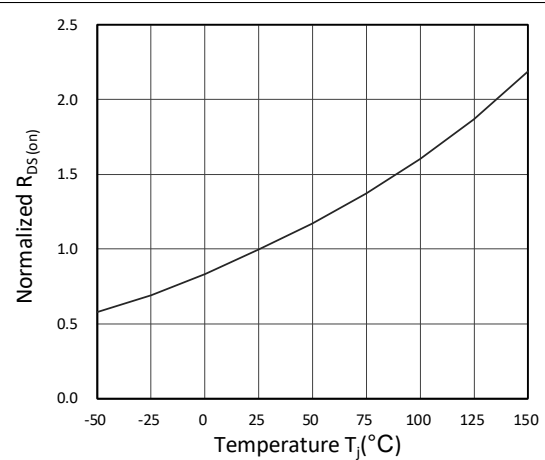


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

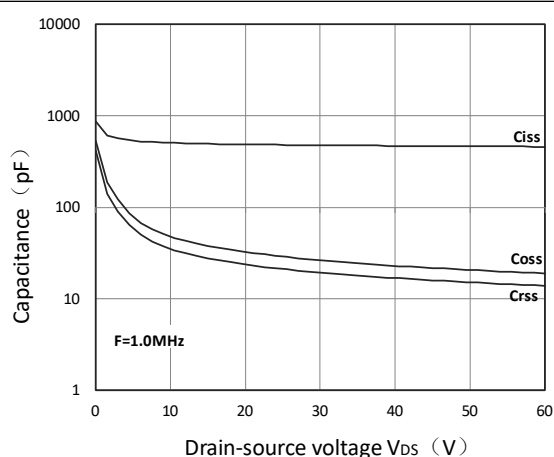


Figure 7. Capacitance Characteristics

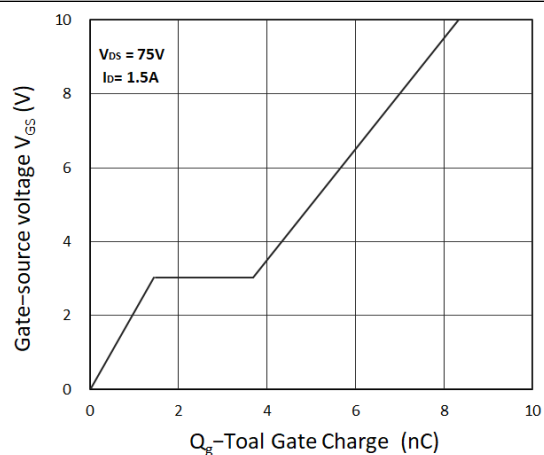


Figure 8. Gate Charge Characteristics

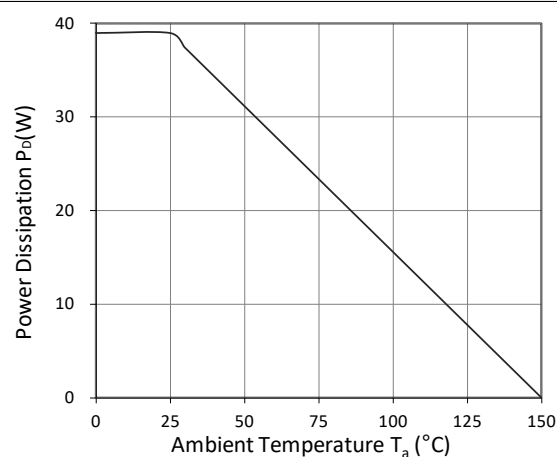


Figure 9. Power Dissipation

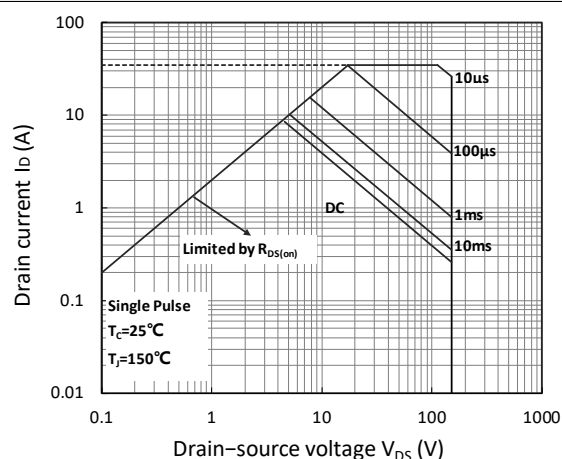


Figure 10. Safe Operating Area

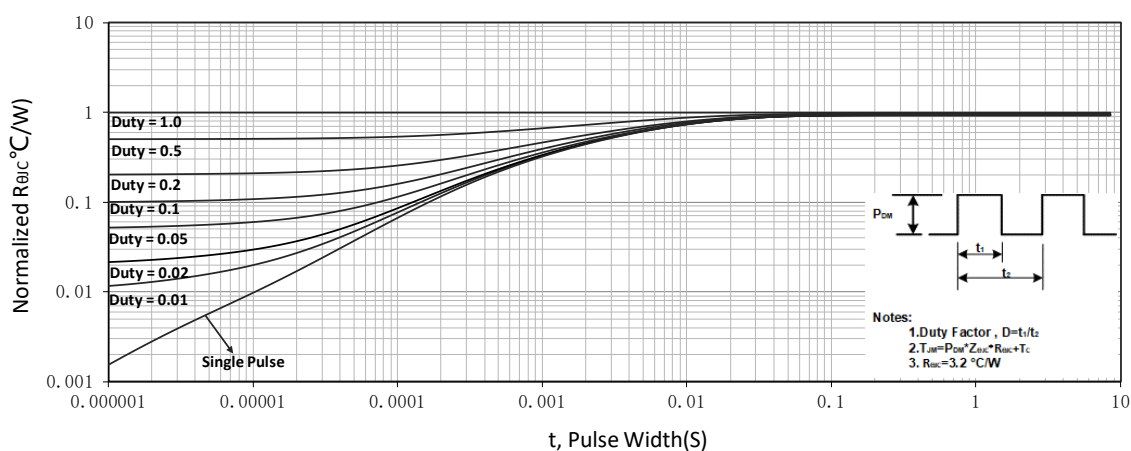


Figure 11. Normalized Maximum Transient Thermal Impedance

Test Circuit

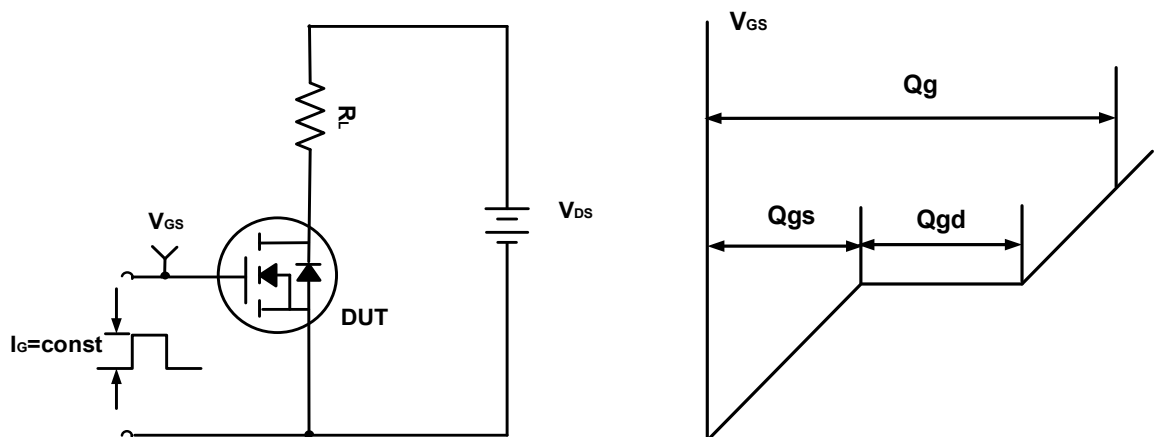


Figure A. Gate Charge Test Circuit & Waveforms

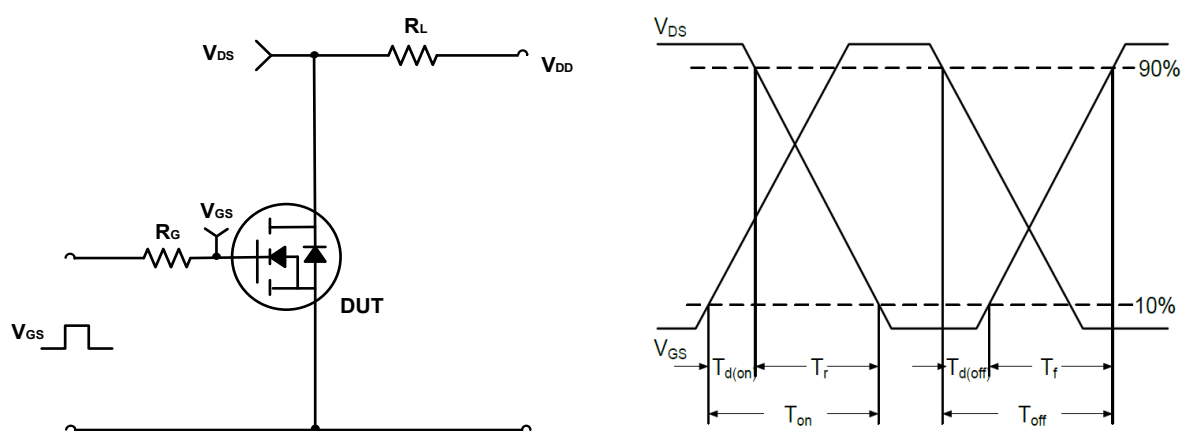


Figure B. Switching Test Circuit & Waveforms

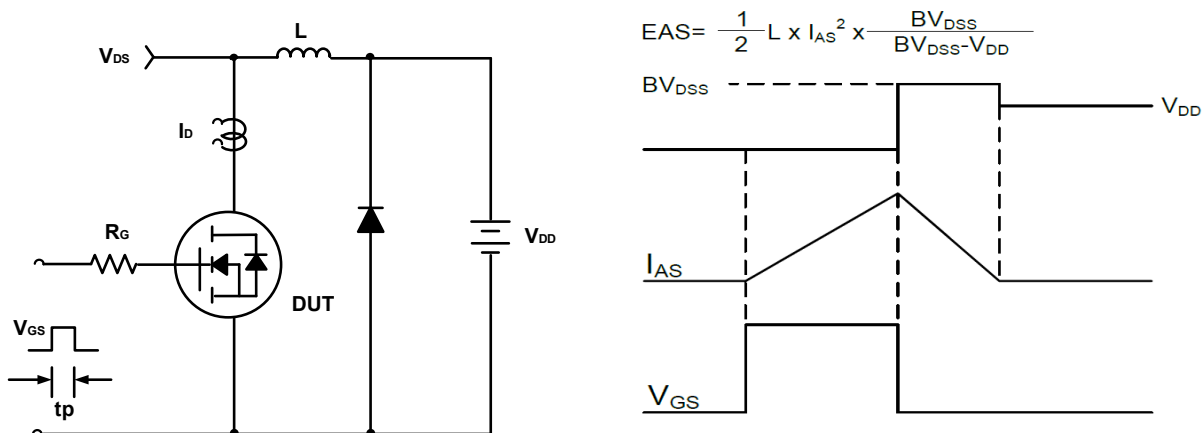
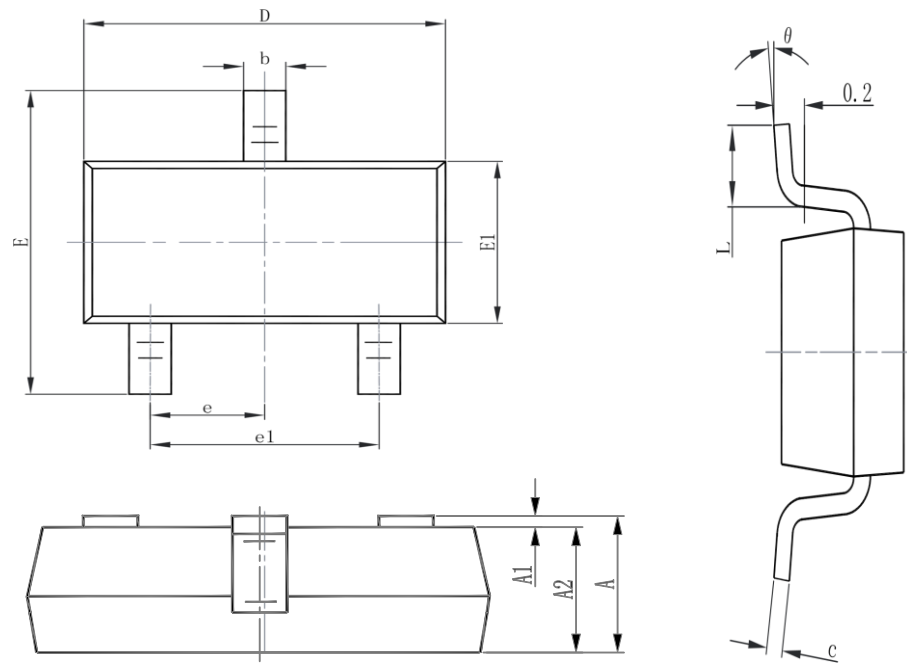


Figure C. Unclamped Inductive Switching Circuit & Waveforms

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°