

Description

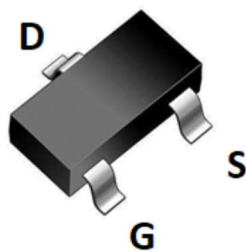
JMD N-channel Depletion Mode Power MOSFET

Features

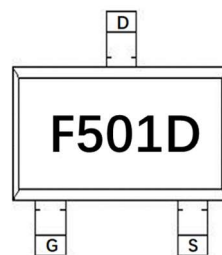
- 600V, 0.03A
 $R_{DS(ON)} < 700\Omega @ V_{GS} = 0V$
 $R_{DS(ON)} < 800\Omega @ V_{GS} = 10V$
- Self-aligned planner technology
- Pb-free lead plating
- Halogen free
- ESD improved capability

Application

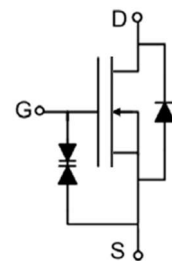
- Load Switch
- PWM Application
- Power management



SOT-23 top view



Marking and pin Assignment



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	OUTLINE	Device Package	Reel Size	Reel (PCS)	Per Carton (PCS)
F501D	JMDL501A	TAPING	SOT-23	7inch	3000	180000

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

Symbol	Parameter	Max.	Units
V_{DSS}	Drain-Source Voltage	600	V
V_{GSS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current	$T_A = 25^\circ\text{C}$	0.03
		$T_A = 100^\circ\text{C}$	0.02
I_{DM}	Pulsed Drain Current <small>note1</small>	0.12	A
dv/dt	Peak Diode Recovery dv/dt	5.0	V/ns
$V_{ESD(G-S)}$	Gate source ESD (HBM-C= 100pF, R=1.5k Ω)	300	V
P_D	Power Dissipation	$T_A = 25^\circ\text{C}$	0.5
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	250	$^\circ\text{C}/\text{W}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$



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} = -5V, I _D =250μA	600	-	-	V
I _{D(off)}	Off-state Drain to Source Current	V _{DS} =600V, V _{GS} = -5V, T _J =25°C	-	-	0.1	μA
		V _{DS} =480V, V _{GS} =-5V, T _J =125°C	-	-	10	μA
I _{GSS}	Gate to Source Leakage Current	V _{DS} =0V, V _{GS} = ±20V	-	-	±100	nA
On Characteristics						
I _{DSS}	On-state drain current	V _{GS} =0V, V _{DS} =25V	12	-	-	mA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =3V, I _D =8μA	-2.7	-1.8	-1.0	V
R _{DS(on)}	Static Drain-Source on-Resistance <small>note2</small>	V _{GS} =0V, I _D =3mA	-	350	700	Ω
		V _{GS} =10V, I _D =16mA	-	400	800	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =25V, V _{GS} =-5V, f = 1.0MHz	-	50	-	pF
C _{oss}	Output Capacitance		-	4.53	-	pF
C _{rss}	Reverse Transfer Capacitance		-	1.08	-	pF
Q _g	Total Gate Charge	V _{DS} =400V, I _D =0.01A, V _{GS} =-5V to 5V	-	1.14	-	nC
Q _{gs}	Gate-Source Charge		-	0.5	-	nC
Q _{gd}	Gate-Drain("Miller") Charge		-	0.37	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DS} =300V, I _D =0.01A, R _{GEN} =6Ω, V _{GS} =-5V to 7V	-	9.9	-	ns
t _r	Turn-on Rise Time		-	55.8	-	ns
t _{d(off)}	Turn-off Delay Time		-	56.4	-	ns
t _f	Turn-off Fall Time		-	136	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	0.03	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	0.12	A
V _{SD}	Diode Forward Voltage	I _F =16mA, V _{GS} =-5V	-	-	1.2	V
t _{rr}	Reverse Recovery Time	V _{GS} =-5V, I _F =0.01A,	-	243	-	ns
Q _{rr}	Reverse Recovery Charge	di/dt=100A/μs	-	636	-	nC

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

2. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%



Figure 1: Output Characteristics

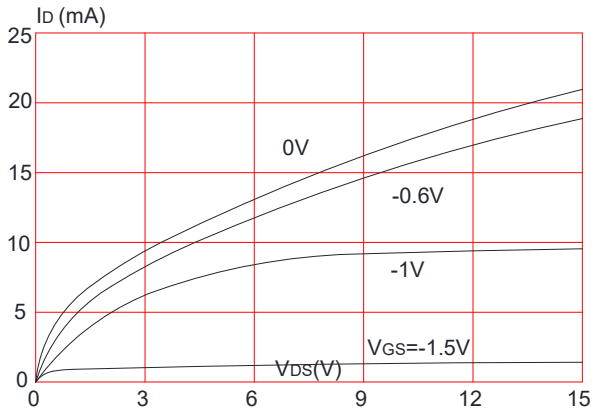


Figure 2: Typical Transfer Characteristics

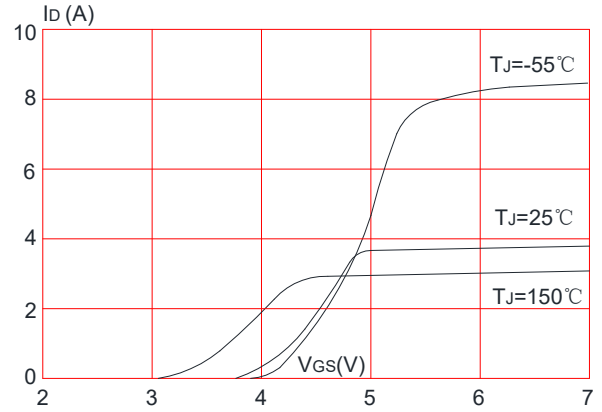


Figure 3: On-resistance vs. Drain Current

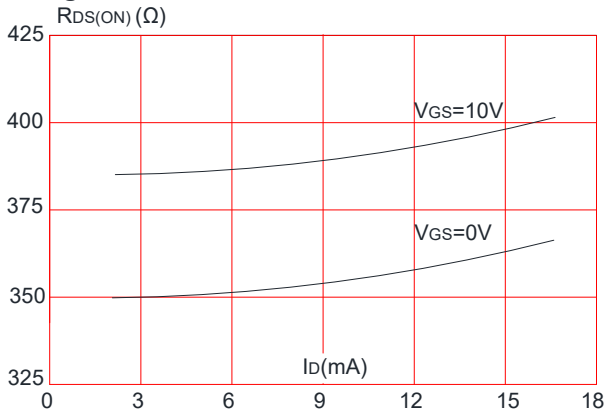


Figure 4: Body Diode Characteristics

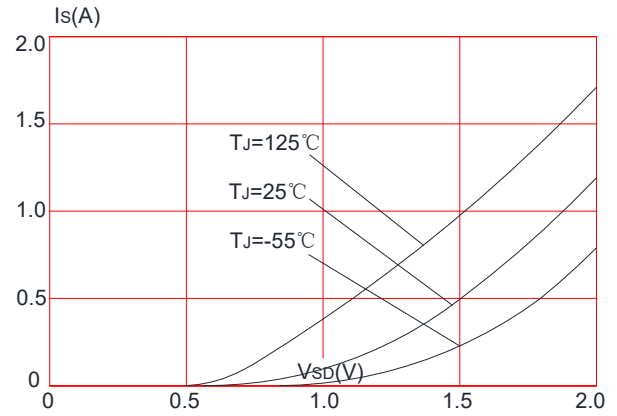


Figure 5: Gate Charge Characteristics

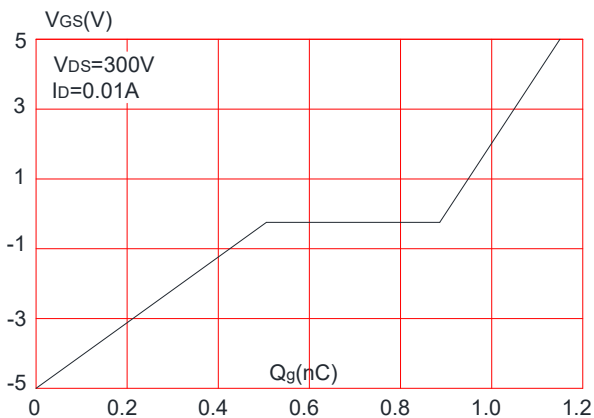


Figure 6: Capacitance Characteristics

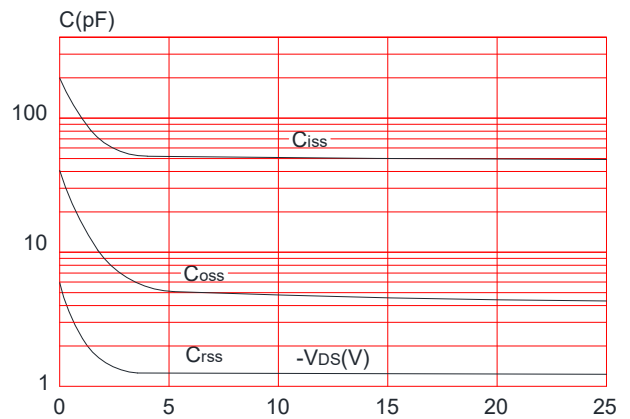


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

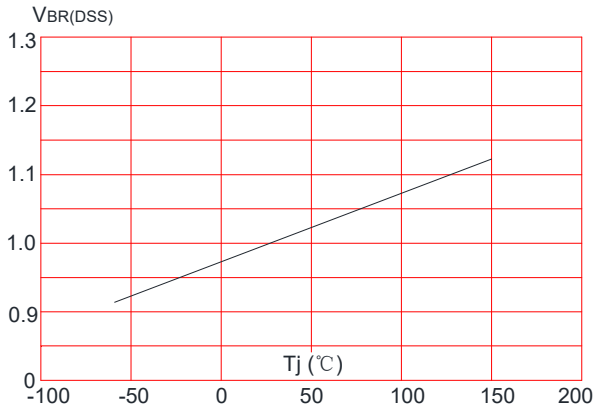


Figure 8: Normalized on Resistance vs. Junction Temperature

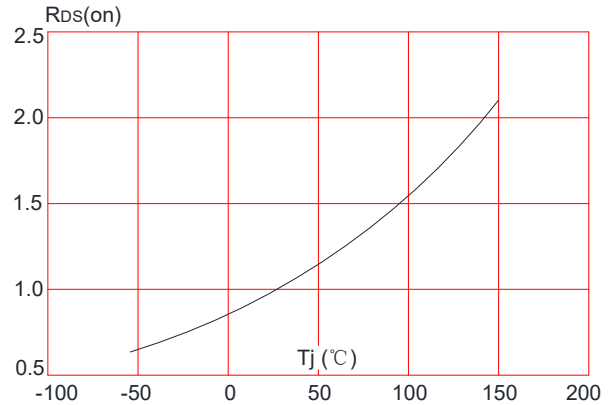


Figure 9: Maximum Safe Operating Area

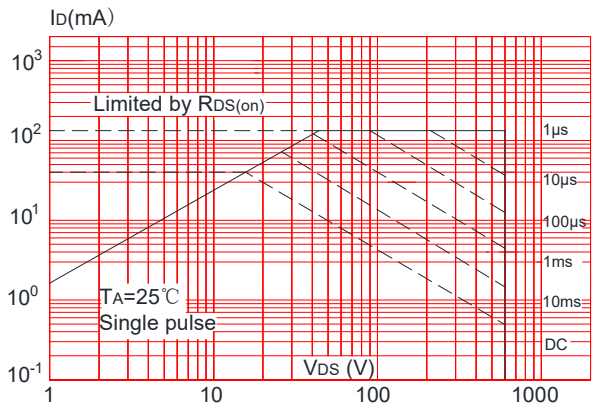


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

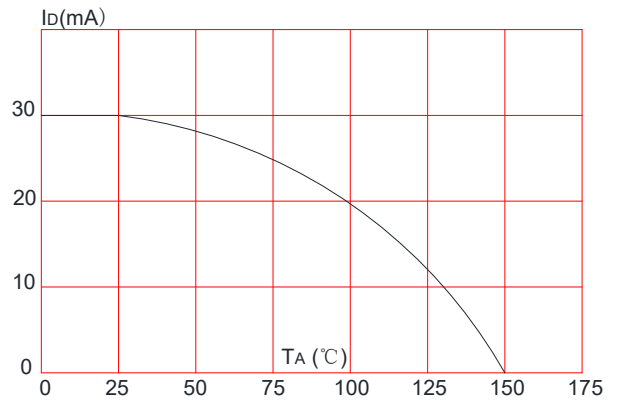
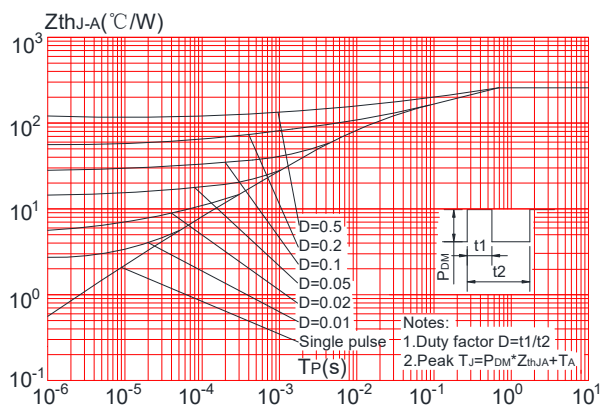


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



Test Circuit

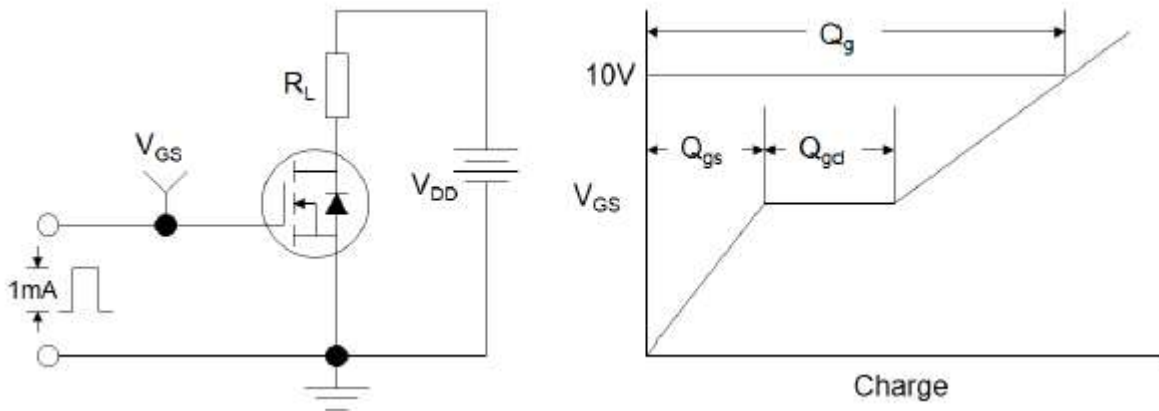


Figure1:Gate Charge Test Circuit & Waveform

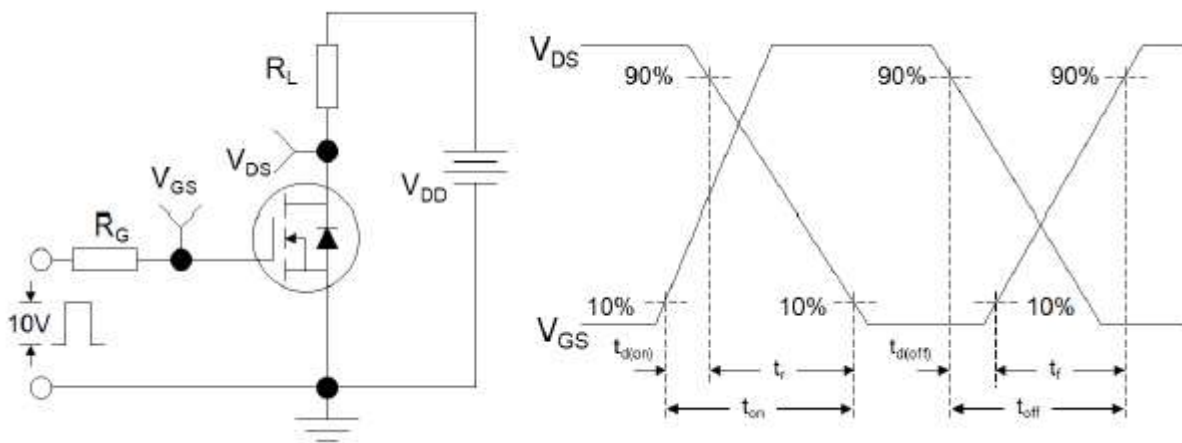


Figure 2: Resistive Switching Test Circuit & Waveforms

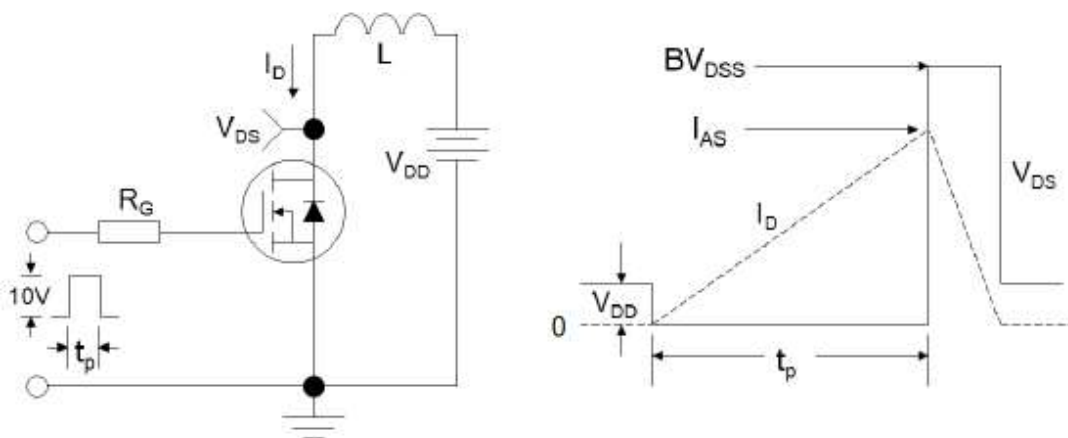
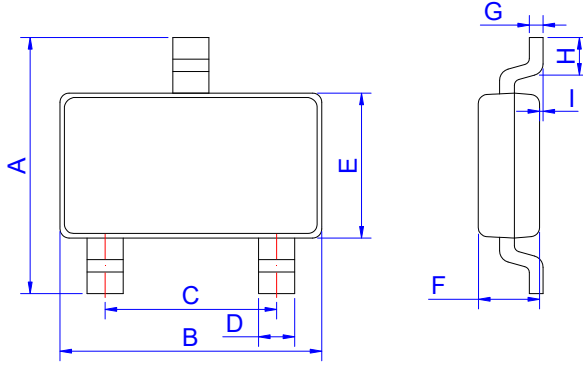


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

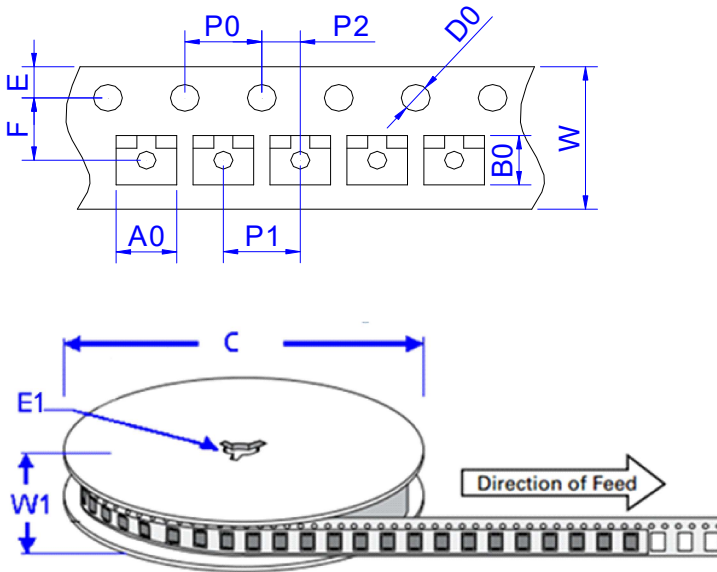
Package Mechanical Data-SOT-23



SOT-23

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.30	2.40	2.50	0.091	0.095	0.098
B	2.80	2.90	3.00	0.110	0.114	0.118
C	1.90 REF			0.075 REF		
D	0.35	0.40	0.45	0.014	0.016	0.018
E	1.20	1.30	1.40	0.047	0.051	0.055
F	0.90	1.00	1.10	0.035	0.039	0.043
G		0.10	0.15		0.004	0.006
H	0.20			0.008		
I	0		0.10	0		0.004

Package Information-SOT-23




Ref.	Dimensions	
	Millimeters	Inches
A0	3.15 ± 0.3	0.124 ± 0.012
B0	2.77 ± 0.3	0.109 ± 0.012
C	178	7.0
D0	1.50±0.1	0.059 ± 0.004
E	1.75 ± 0.2	0.069 ± 0.008
E1	13.3±0.3	0.524± 0.012
F	3.5 ± 0.2	0.138 ± 0.008
P0	4.00 ± 0.2	0.157 ± 0.008
P1	4.00 ± 0.2	0.157 ± 0.008
P2	2.00 ± 0.2	0.079 ± 0.008
W	8.00 ± 0.2	0.315 ± 0.008
W1	11.5±1.0	0.453 ± 0.039



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