

150V(D-S) N-Channel Enhancement Mode Power MOS FET

General Features

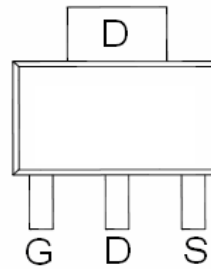
- $V_{DS} = 150V, I_D = 2A$
 $R_{DS(ON)} < 300m\Omega @ V_{GS}=10V$ (Typ:260m Ω)
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation



Lead Free

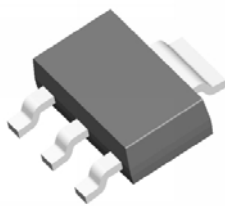
Application

- Power switching application
- Hard switched and high frequency circuits

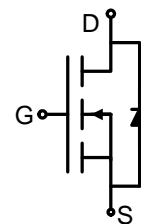


Marking and pin assignment

PIN Configuration



SOT-223-3L view



Schematic diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
MSN1502U	MSN1502U	SOT-223-3L	Ø330mm	12mm	2500 units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	150	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	2	A
Drain Current-Pulsed ^(Note 1)	I_{DM}	6	A
Maximum Power Dissipation	P_D	2	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^{\circ}C$

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient ^(Note 2)	$R_{\theta JA}$	62.5	$^{\circ}C/W$
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Electrical Characteristics (T_A=25°C unless otherwise noted)

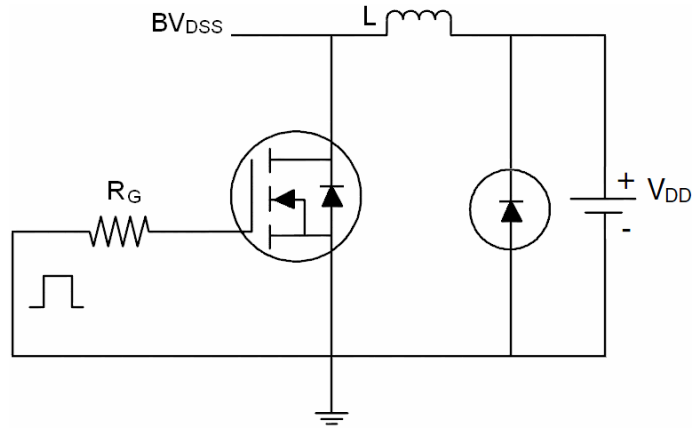
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	150	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =150V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.5	2.0	2.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =1.5A	-	260	300	mΩ
Forward Transconductance	g _{FS}	V _{DS} =15V, I _D =1.5A	-	3	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, F=1.0MHz	-	235	-	PF
Output Capacitance	C _{oss}		-	36	-	PF
Reverse Transfer Capacitance	C _{rss}		-	20	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =75V, I _D =1A, R _L =75Ω V _{GS} =10V, R _G =6Ω	-	8	-	nS
Turn-on Rise Time	t _r		-	10	-	nS
Turn-Off Delay Time	t _{d(off)}		-	20	-	nS
Turn-Off Fall Time	t _f		-	15	-	nS
Total Gate Charge	Q _g	V _{DS} =75V, I _D =1.5A, V _{GS} =10V	-	8	-	nC
Gate-Source Charge	Q _{gs}		-	1.4	-	nC
Gate-Drain Charge	Q _{gd}		-	2.1	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =2A	-	-	1.2	V
Diode Forward Current (Note 2)	I _S		-	-	2	A

Notes:

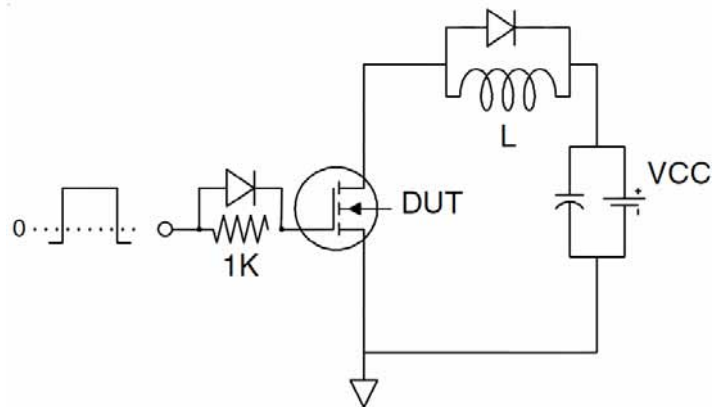
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to product

Test Circuit

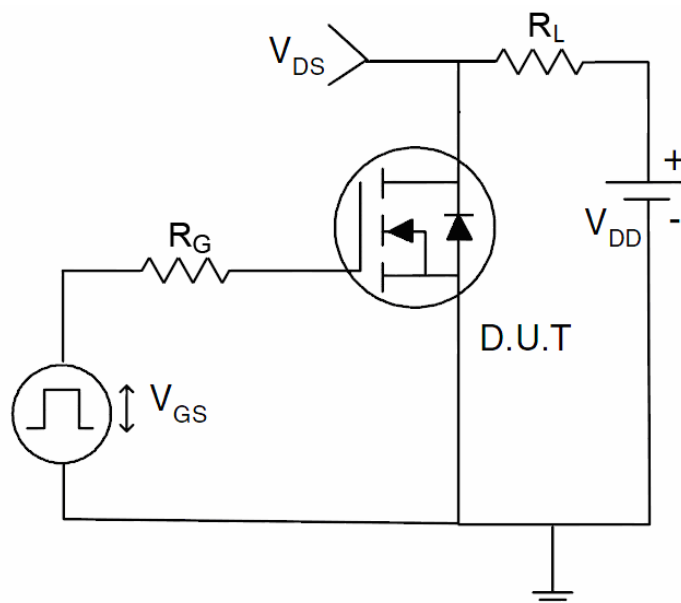
1) E_{AS} Test Circuit



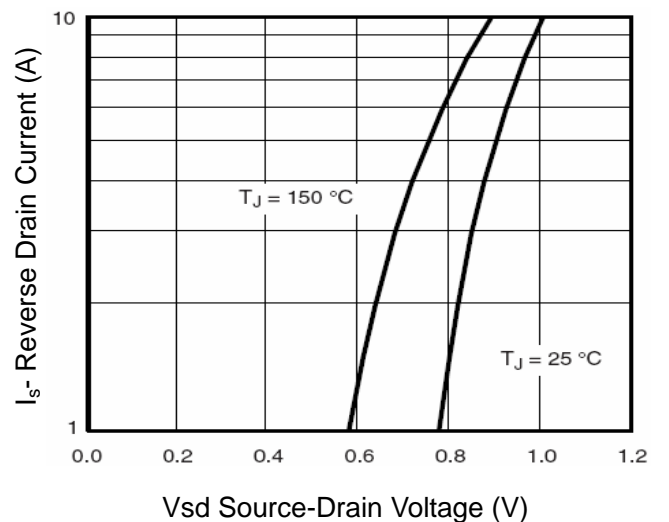
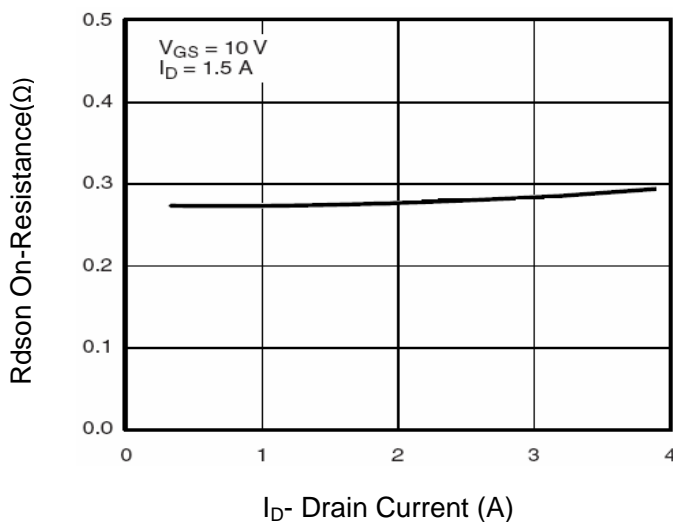
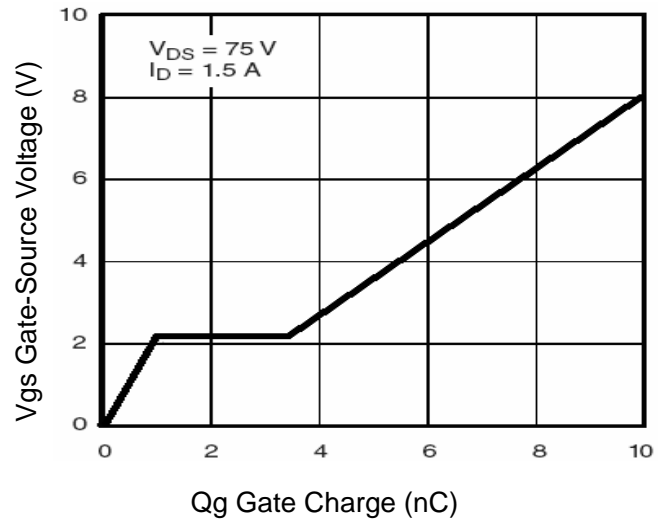
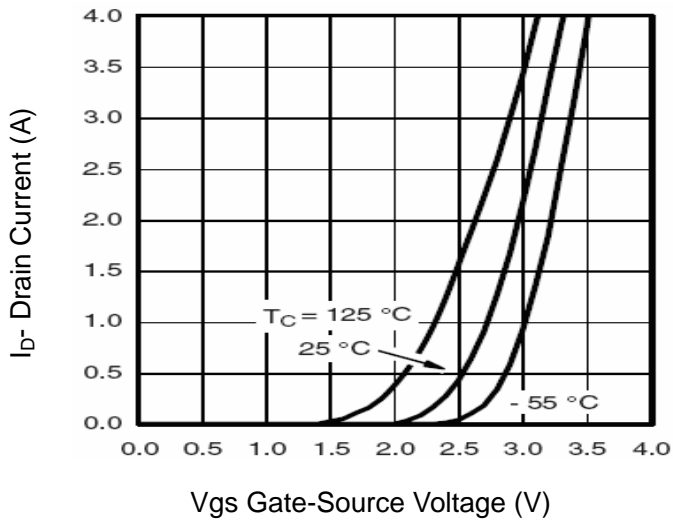
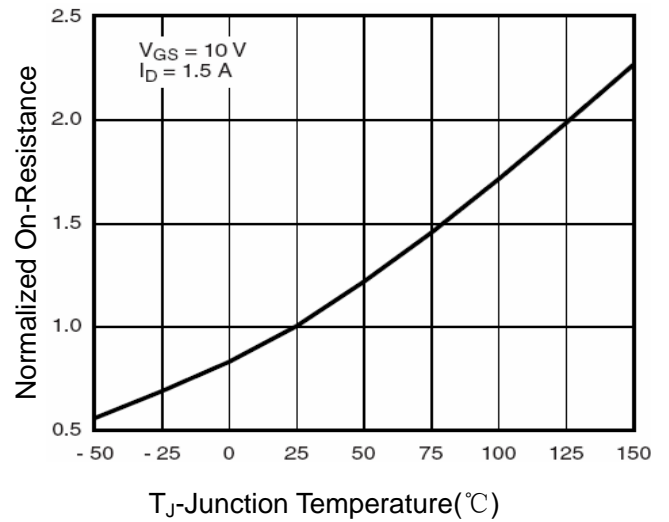
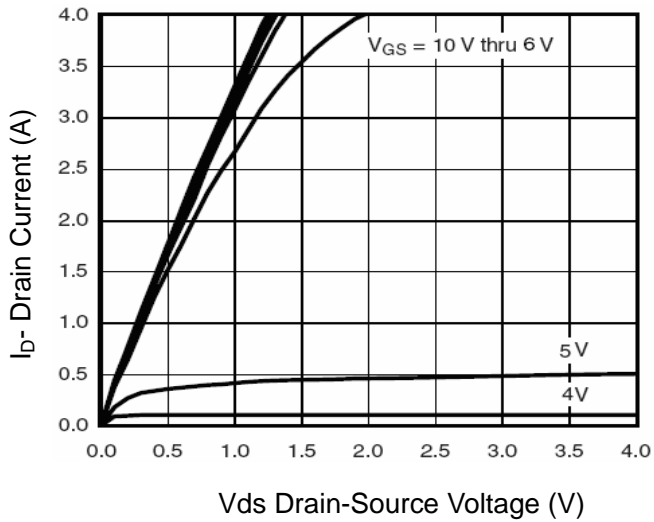
2) Gate Charge Test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)



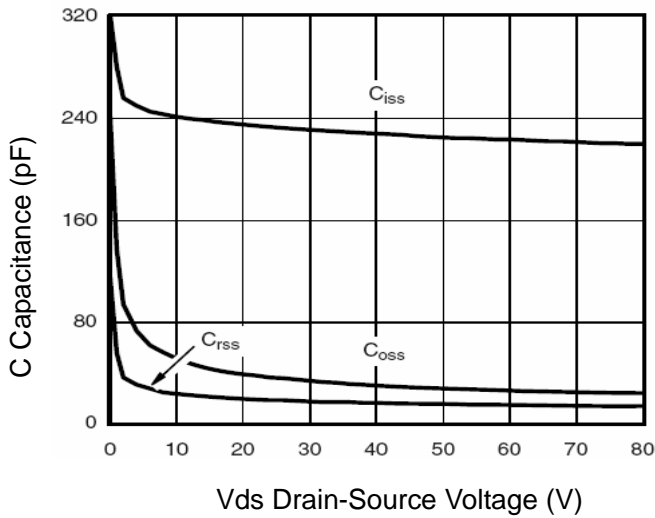


Figure 7 Capacitance vs Vds

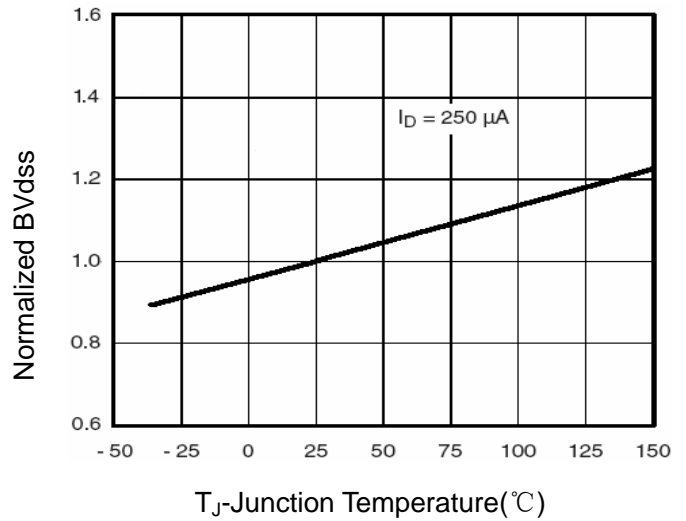


Figure 9 BV_{DSS} vs Junction Temperature

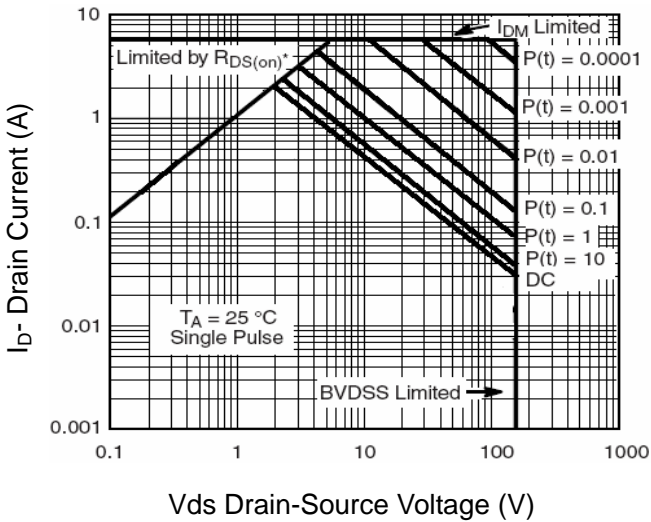


Figure 8 Safe Operation Area

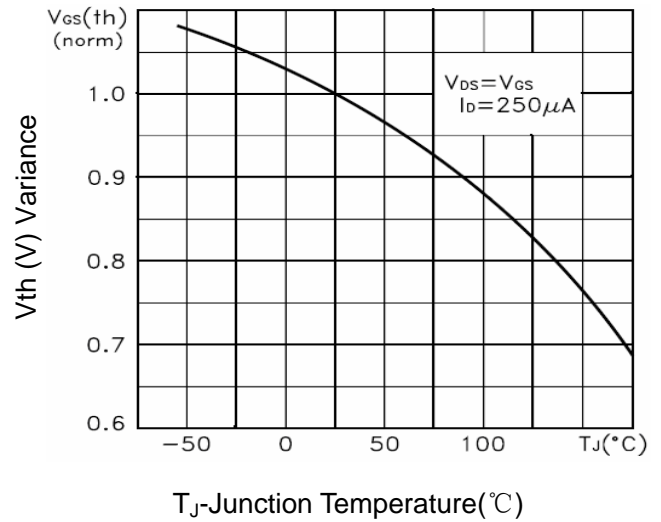


Figure 10 $V_{GS(th)}$ vs Junction Temperature

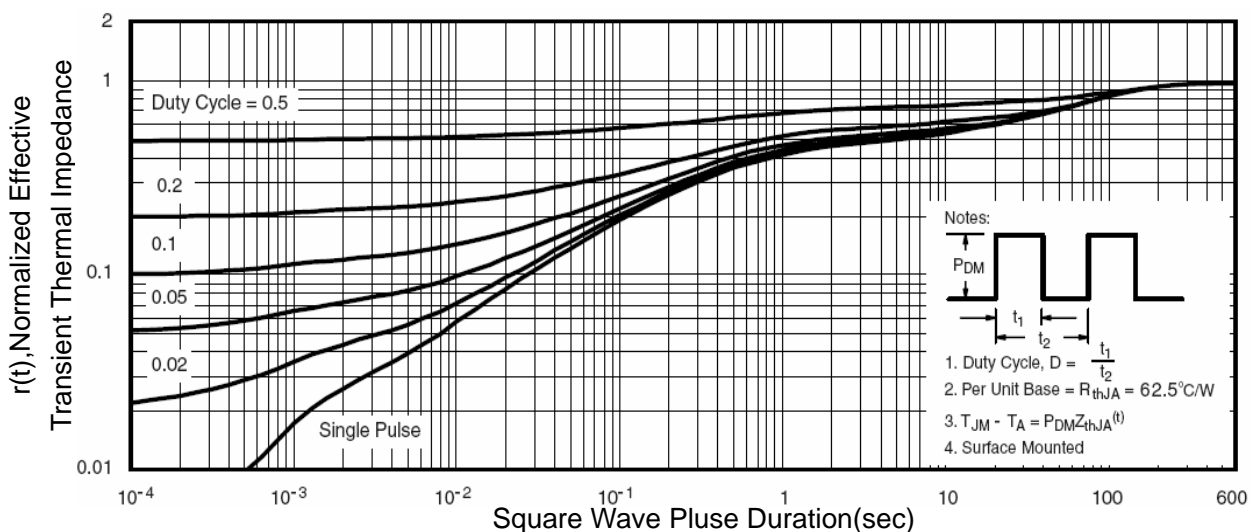
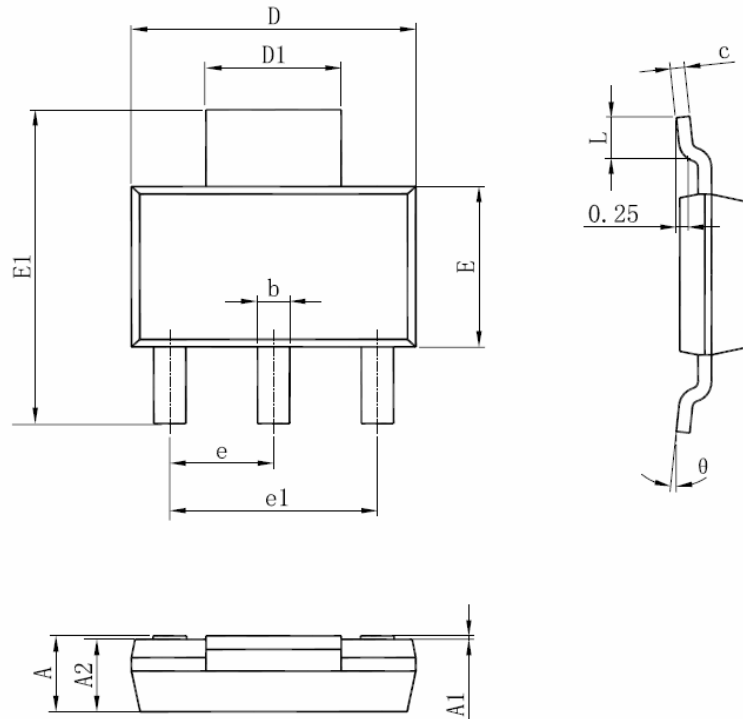


Figure 11 Normalized Maximum Transient Thermal Impedance

SOT-223-3L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.520	1.800	0.060	0.071
A1	0.000	0.100	0.000	0.004
A2	1.500	1.700	0.059	0.067
b	0.660	0.820	0.026	0.032
c	0.250	0.350	0.010	0.014
D	6.200	6.400	0.244	0.252
D1	2.900	3.100	0.114	0.122
E	3.300	3.700	0.130	0.146
E1	6.830	7.070	0.269	0.278
e	2.300(BSC)		0.091(BSC)	
e1	4.500	4.700	0.177	0.185
L	0.900	1.150	0.035	0.045
θ	0°	10°	0°	10°

Notes

1. All dimensions are in millimeters.
2. Tolerance $\pm 0.10\text{mm}$ (4 mil) unless otherwise specified
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.