General Description

The WSR20N10 uses advanced Ternch MOSFET to provide excellent $R_{DS(ON)}$, low gate charge

This device is suitable for use as a Battery protection or in other Switching application.

Product Summery

BV_{DSS}	$R_{DS(ON)}$	I_D
100V	72mΩ	20A

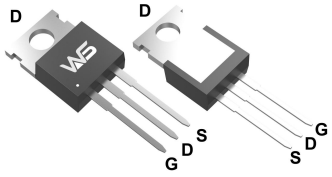
Features

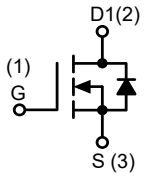
- 100% UIS + R_g Tested.
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)
- Moisture Sensitivity Level MSL1 (per JEDEC J-STD-020D)

Applications

- Power Management in Notebook Computer, Portable Equipment and Battery Powered Systems.

TO-220-3L Pin Configuration





Absolute Maximum Ratings (T_A=25°C, Unless Otherwise Noted)

Symbol	Parameter		Rating	Units
V_{DS}	Drain-Source Voltage		100	V
V_{GS}	Gate-Source Voltage		±20	
I_S	Diode Continuous Forward Current	T_C=25°C	20	A
I_D	Continuous Drain Current	T_C=25°C	20	
		T_C=100°C	12	
I_{DM} [2]	Pulse Drain Current	T_C=25°C	45	
P_D	Maximum Power Dissipation	T_C=25°C	30	W
		T_C=100°C	17	
$R_{\theta JA}$ [4]	Thermal Resistance-Junction to Ambient	Steady State	62.5	°C/W
$R_{\theta JC}$	Thermal Resistance-Junction to Case		5	
I_{AS} [3]	Avalanche Current, Single pulse	L=0.5mH	8	A
E_{AS} [3]	Avalanche Energy, Single pulse	L=0.5mH	90	mJ
T_{STG}	Storage Temperature Range		-55 to 150	°C
T_J	Maximum Junction Temperature		-55 to 150	

Electrical Characteristics (T_A=25°C, Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250μA	100	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=48V , V_{GS}=0V	---	---	1.0	μA
		T_J=85°C	---	---	30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_{DS}=250μA	1.2	2.0	2.5	V
I_{GSS}	Gate Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
$R_{DS(ON)}$ [5]	Drain-Source On-state Resistance	V_{GS}=10V , I_D=2A	---	72	100	mΩ
		V_{GS}=4.5V , I_D=1A	---	88	110	
Diode Characteristics						
V_{SD} [5]	Diode Forward Voltage	I_{SD}=1A , V_{GS}=0V	---	0.8	1.3	V
t_{rr}	Reverse Recovery Time	I_{DS}=60A , di_{SD}/dt=100A/μs	---	50	---	ns
Q_{rr}	Reverse Recovery Charge		---	70	---	nC
Dynamic Characteristics [6]						
R_g	Gate Resistance	V_{GS}=0V , V_{DS}=0V , f=1.0MHz	---	3.0	---	Ω
C_{iss}	Input Capacitance	V_{GS}=0V , V_{DS}=20V , Frequency=1.0MHz	---	1215	---	pF
C_{oss}	Output Capacitance		---	56	---	
C_{rss}	Reverse Transfer Capacitance		---	45	---	
$T_{d(on)}$	Turn-on Delay Time	V_{DD}=30V , R_L=30Ω , I_{DS}=5A , V_{GEN}=10V , R_G=1.8Ω	---	3.9	---	ns
T_r	Turn-on Rise Time		---	26	---	
$T_{d(off)}$	Turn-off Delay Time		---	17	---	
T_f	Turn-off Fall Time		---	9	---	
Gate Charge Characteristics [6]						
Q_g	Total Gate Charge	V_{DS}=50V , V_{GS}=10V , I_{DS}=6A	---	12	---	nC
Q_{gs}	Gate-Source Charge		---	3	---	
Q_{gd}	Gate-Drain Charge		---	2	---	

Note:

1. Calculated continuous current based on maximum allowable junction temperature. Bonding wire limitation current is 8A.
2. Pulse width limited by max. junction temperature.
3. UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature T_J=25°C).
4. Surface Mounted on 1in² pad area.
5. Pulse test ; pulse width≤300μs, duty cycle≤2%.
6. Guaranteed by design, not subject to production testing.

Typical Characteristics

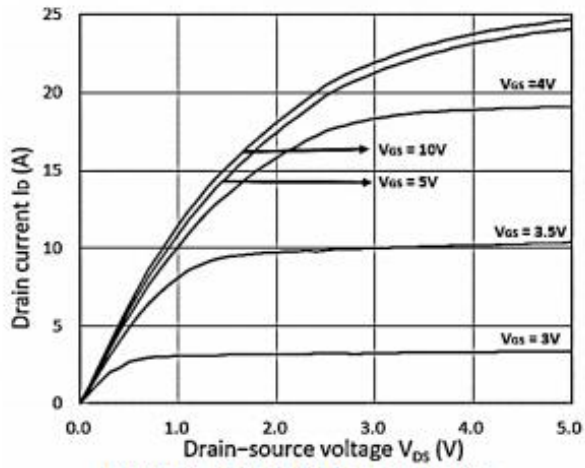


Figure 1. Output Characteristics

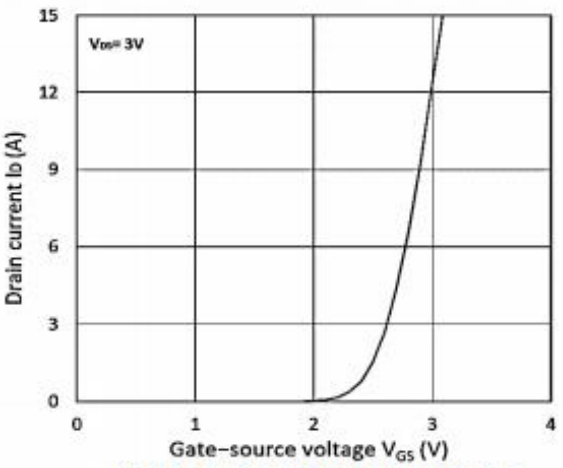


Figure 2. Transfer Characteristics

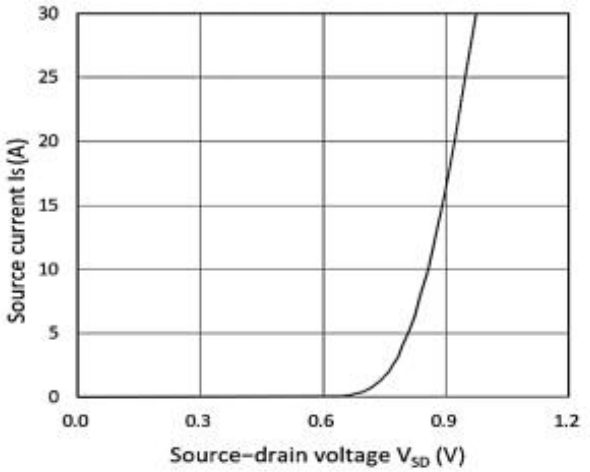


Figure 3. Forward Characteristics of Reverse

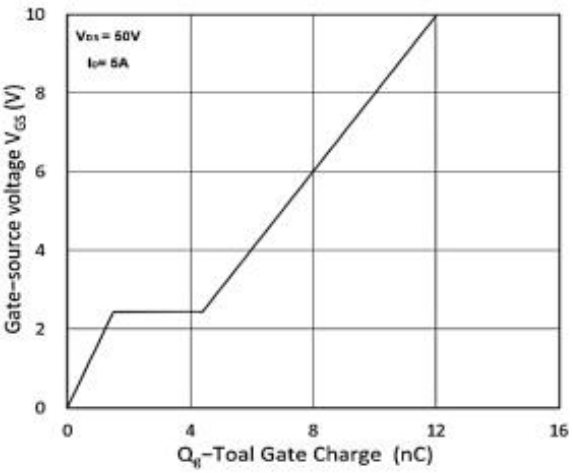


Figure 4. Gate Charge Characteristics

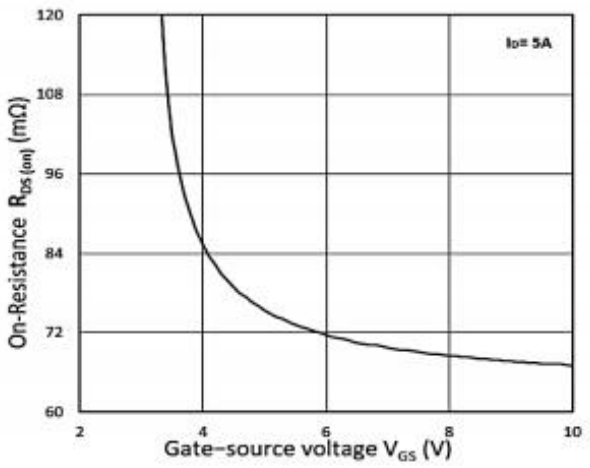


Figure 5. R DS(on) vs. V GS

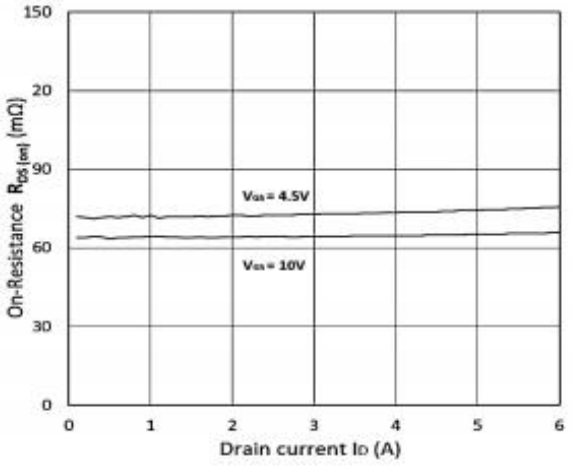


Figure 6. R DS(on) vs. ID

Typical Characteristics (Cont.)

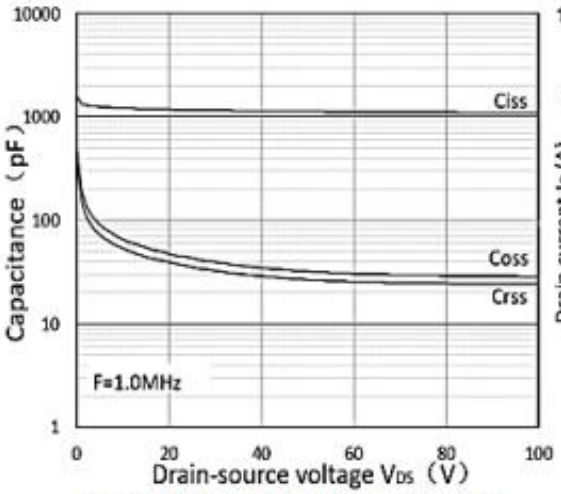


Figure 7. Capacitance Characteristics

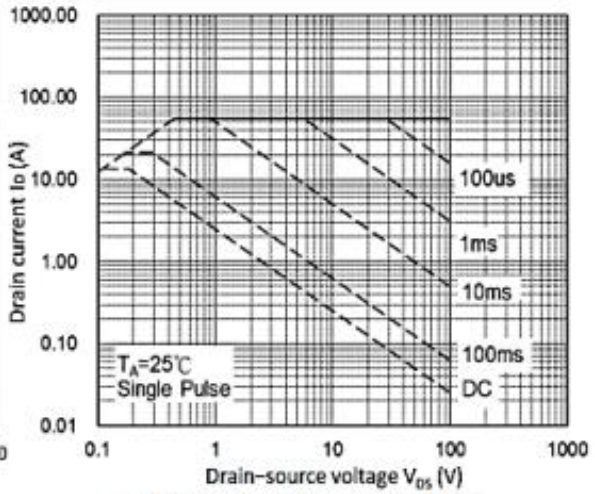


Figure 8. Safe Operating Area

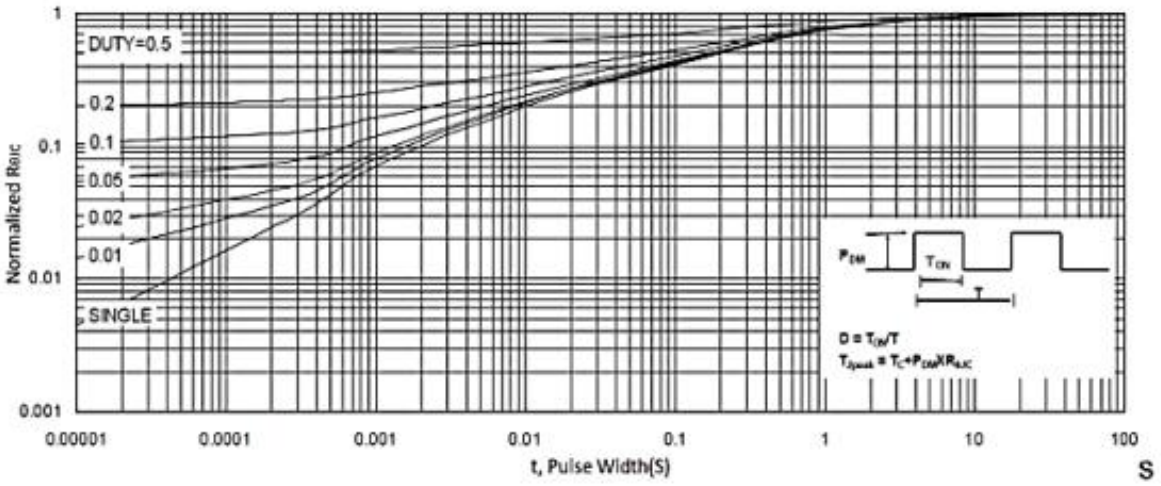


Figure 9. Normalized Maximum Transient Thermal Impedance

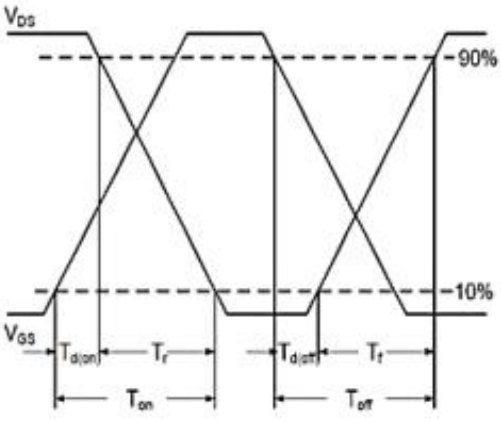


Figure 10. Switching Time Waveform

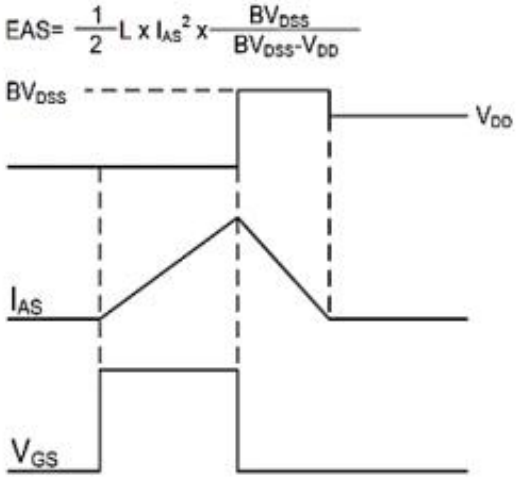
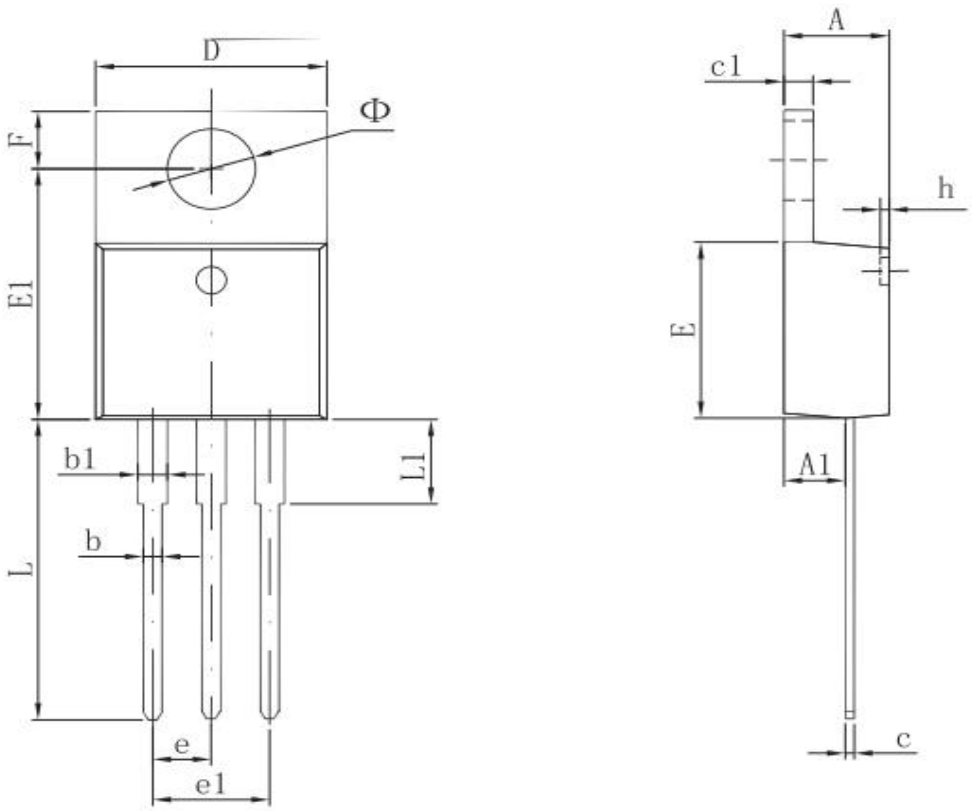


Figure 11. Unclamped Inductive Switching Waveform

Packaging information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.470	4.670	0.176	0.184
A1	2.520	2.820	0.099	0.111
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
E1	12.060	12.460	0.475	0.491
e	2.540 TYP		0.100 TYP	
e1	4.980	5.180	0.196	0.204
F	2.590	2.890	0.102	0.114
h	0.000	0.300	0.000	0.012
L	13.400	13.800	0.528	0.543
L1	3.560	3.960	0.140	0.156
Φ	3.735	3.935	0.147	0.155

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