

General Description

The WSR20N20 is the highest performance trench N-Ch MOSFET with extreme high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications .

The WSR20N20 meet the RoHS and Green Product requirement , 100% EAS guaranteed with full function reliability approved.

Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent Cdv/dt effect decline
- Green Device Available

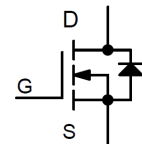
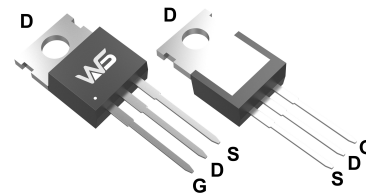
Product Summary

BV_{DSS}	R_{DSON}	I_D
200V	120mΩ	20A

Applications

- High Frequency Point-of-Load Synchronous Buck Converter
- Networking DC-DC Power System
- Load Switch

TO-220F Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	200	V
V_{GS}	Gate-Source Voltage	±20	V
$I_D@T_C=25^{\circ}C$	Continuous Drain Current, $V_{GS} @ 10V^1$	20	A
$I_D@T_C=100^{\circ}C$	Continuous Drain Current, $V_{GS} @ 10V^1$	11	A
I_{DM}	Pulsed Drain Current ²	72	A
EAS	Single Pulse Avalanche Energy ³	340	mJ
P_D	Total Power Dissipation ³	104	W
T_{STG}	Storage Temperature Range	-55 to 175	°C
T_J	Operating Junction Temperature Range	-55 to 175	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient ¹	---	62.5	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	1.2	°C/W

Electrical Characteristics (T_J=25 °C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	200	---	---	V
ΔBV _{DSS} /ΔT _J	BVDSS Temperature Coefficient	Reference to 25°C, I _D =1mA	---	0.098	---	V/°C
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =9A	---	120	150	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	2.0	3.0	4.0	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	-4.57	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =160V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =160V, V _{GS} =0V, T _J =55°C	---	---	5	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±25V, V _{DS} =0V	---	---	±100	nA
g _{fs}	Forward Transconductance	V _{DS} =5V, I _D =9A	---	32	---	S
Q _g	Total Gate Charge (10V)	V _{DS} =100V, V _{GS} =10V, I _D =18A	---	41	---	nC
Q _{gs}	Gate-Source Charge		---	5.5	---	
Q _{gd}	Gate-Drain Charge		---	75	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} =30V, V _{GS} =10V, R _G =6Ω, I _D =18A, R _L =30Ω	---	24	---	ns
T _r	Rise Time		---	45	---	
T _{d(off)}	Turn-Off Delay Time		---	101	---	
T _f	Fall Time		---	95	---	
C _{iss}	Input Capacitance	V _{DS} =30V, V _{GS} =0V, f=1MHz	---	1318	---	pF
C _{oss}	Output Capacitance		---	180	---	
C _{rss}	Reverse Transfer Capacitance		---	75	---	

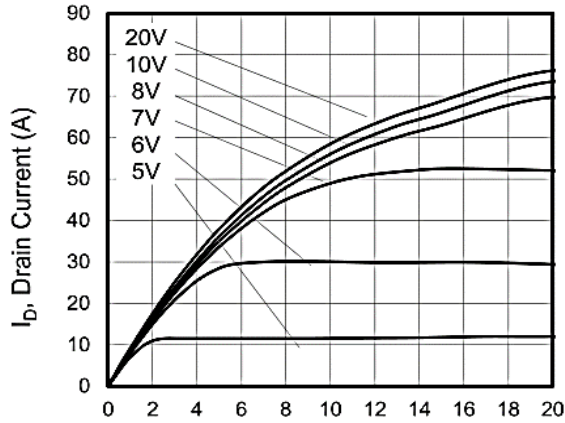
Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current ^{1,6}	V _G =V _D =0V, Force Current	---	---	18	A
I _{SM}	Pulsed Source Current ^{2,6}		---	---	72	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V, I _S =18A, T _J =25°C	---	---	1.2	V
t _{rr}	Reverse Recovery Time	I _F =18A, dI/dt=100A/μs, T _J =25°C	---	230	---	nS
Q _{rr}	Reverse Recovery Charge		---	1800	---	nC

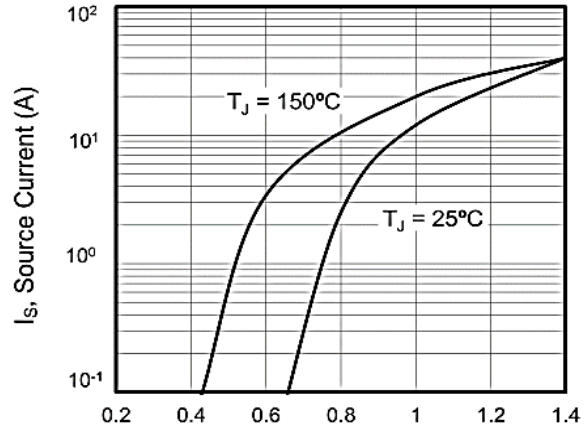
Notes:

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 production
5. EAS condition: T_J=25°C, V_{DD}=50V, V_G=10V, L=0.5mH, R_G=25Ω

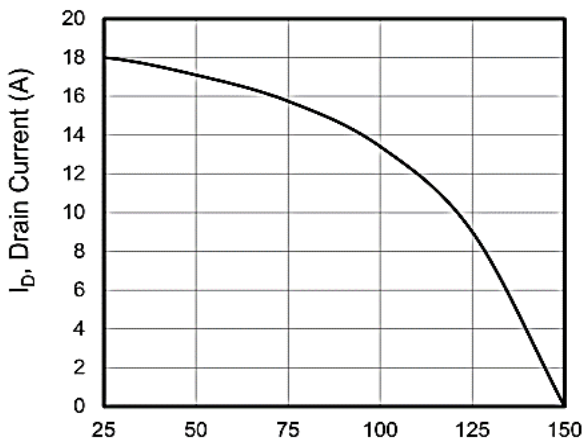
Typical Characteristics



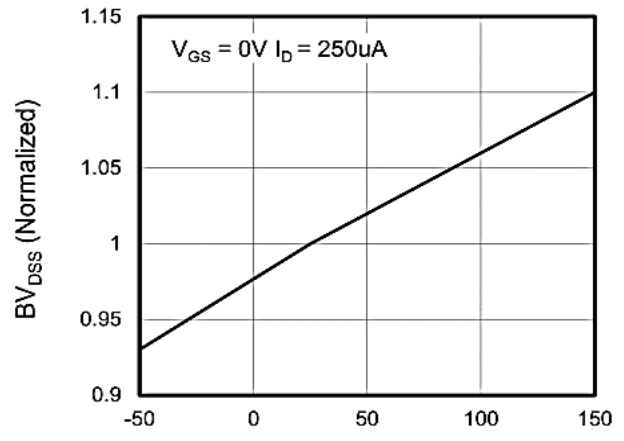
V_{DS} , Drain-to-Source Voltage (V)
Figure 1. Output Characteristics ($T_J = 25^\circ\text{C}$)



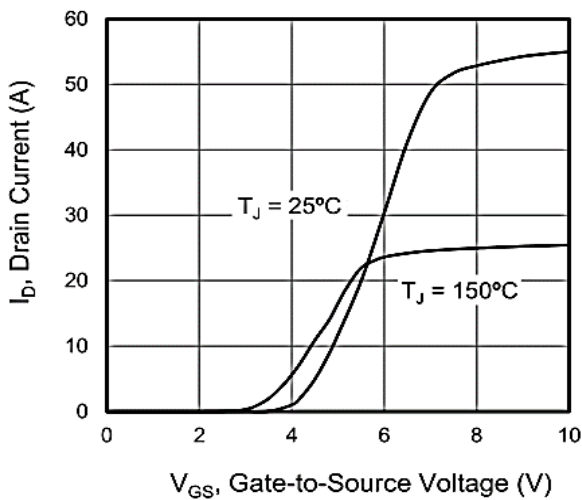
V_{SD} , Source-to-Drain Voltage (V)
Figure 2. Body Diode Forward Voltage



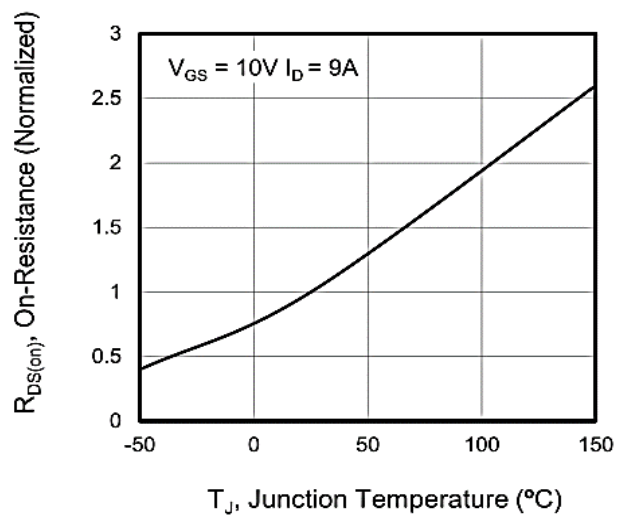
T_C , Case Temperature (A)
Figure 3. Drain Current vs. Temperature



T_J , Junction Temperature ($^\circ\text{C}$)
Figure 4. BV_{DSS} Variation vs. Temperature

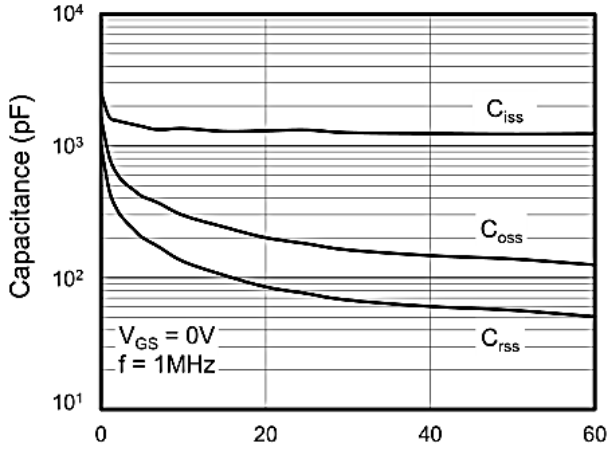


V_{GS} , Gate-to-Source Voltage (V)
Figure 5. Transfer Characteristics



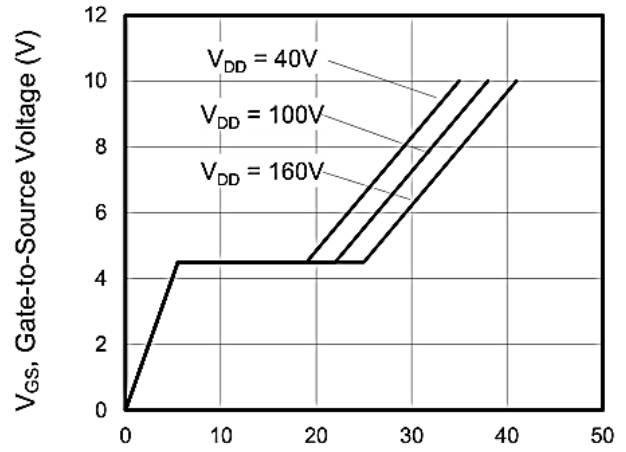
T_J , Junction Temperature ($^\circ\text{C}$)
Figure 6. On-Resistance vs. Temperature

Typical Characteristics



V_{DS} , Drain-to-Source Voltage (V)

Figure 7. Capacitance



Q_g , Total Gate Charge (nC)

Figure 8. Gate Charge

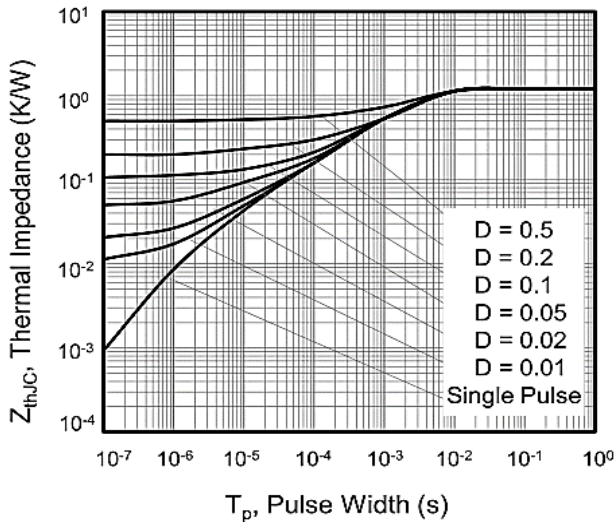
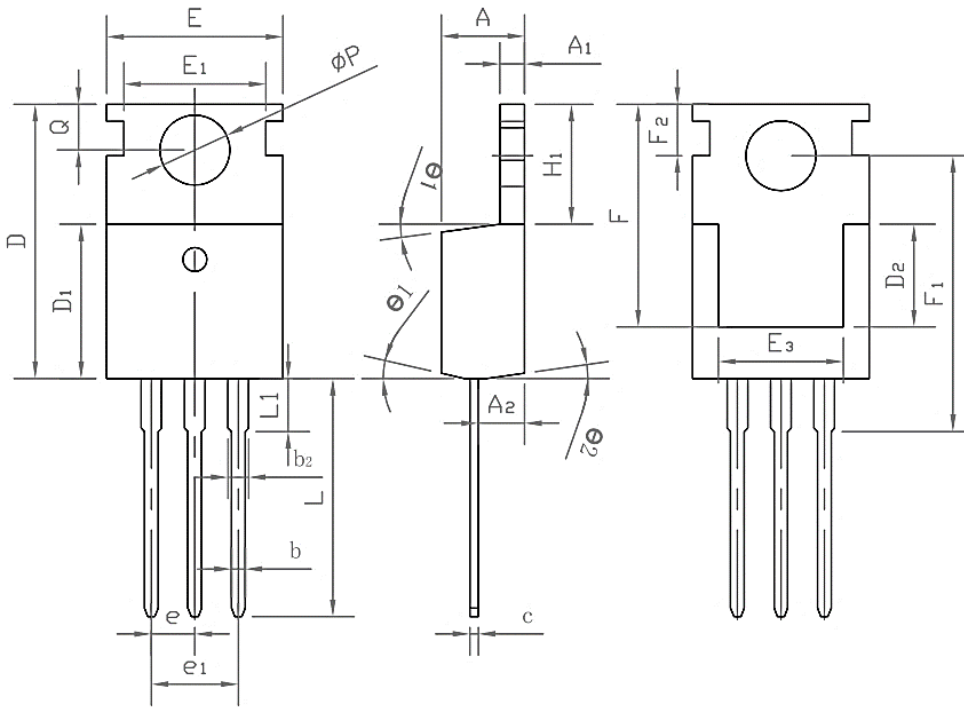


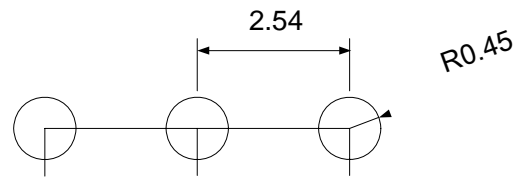
Figure 10. Transient Thermal Impedance

TO-220 Package Information



TO-220	TO-220			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.20	4.80	0.165	0.189
A1	2.34	3.20	0.092	0.126
A2	2.10	2.90	0.083	0.114
b	0.50	0.90	0.020	0.035
b2	0.91	1.90	0.035	0.075
c	0.30	0.80	0.012	0.031
D	8.10	9.40	0.319	0.370
d1	14.50	16.50	0.571	0.650
d2	12.10	12.90	0.476	0.508
E	9.70	10.70	0.382	0.421
e	2.54 BSC		0.100 BSC	
L	13.00	14.50	0.512	0.570
L1	1.60	4.00	0.063	0.157
P	3.00	3.60	0.118	0.142

RECOMMENDED LAND PATTERN



UNIT: mm



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