General Description

The WSK55N20 is the highest performance Planar MOSFET N-Channel MOSFET with extreme high cell density, which provide excellent $R_{DS(ON)}$ and gate charge for most of the synchronous buck converter applications.

The WSK55N20 meet the RoHS and Green Product requirement, 100% E_{AS} guaranteed with full function reliability approved.

Features

- 100% UIS + R_g Tested.
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

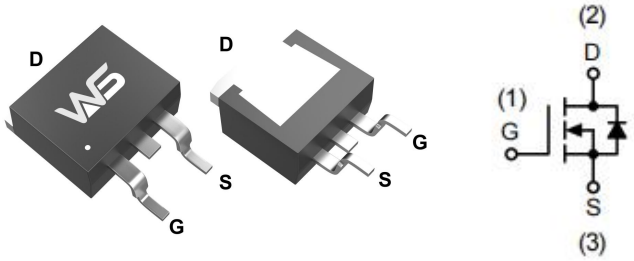
Product Summery

BV_{DSS}	$R_{DS(ON)}$	I_D
200V	48mΩ	55A

Applications

- Power Management for Industrial DC/DC Converters
- Load switch
- Battery protection

TO-263-2L Pin Configuration



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

Symbol	Parameter		Rating	Units
V_{DS}	Drain-Source Voltage		200	V
V_{GS}	Gate-Source Voltage		±20	
I_D [7]	Continuous Drain Current	T_C=25°C	55	A
		T_C=100°C	45	
I_{DM} [3]	Pulse Drain Current		200	
P_D [2]	Power Dissipation	T_C=25°C	158	W
I_{AS} [3]	Single pulse Avalanche Current		30	A
E_{AS} [3]	Single pulse Avalanche Energy	L=0.3mH	800	mJ
T_{STG}	Storage Temperature Range		-55 to 150	°C
T_J	Operating Junction Temperature Range		-55 to 150	
$R_{\theta JA}$ [1,4]	Thermal Resistance-Junction to Ambient	t≤10s	20	°C/W
		Steady State	62	
$R_{\theta JC}$	Thermal Resistance-Junction to Case		1.3	

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250μA	200	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V , I_D=15A	---	48	55	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D=250μA	2.0	3.0	4.0	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=200V , V_{GS}=0V	---	---	1.0	μA
I_{GSS}	Gate-Source Leakage Current	V_{DS}=0V , V_{GS}=±20V	---	---	±100	nA
g_{fs}	Forward Transconductance	V_{DS}=40V , I_D=15A	---	24	---	S
R_G	Gate Resistance	f=1.0MHz	---	25	---	Ω
Q_g	Total Gate Charge (10V)	V_{DS}=160V , V_{GS}=10V , I_D=28A	---	105	---	nC
Q_{gs}	Gate-Source Charge		---	16	---	
Q_{gd}	Gate-Drain Charge		---	53	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DS}=100V , V_{GS}=10V , R_L=1Ω , R_{GEN}=25Ω	---	30	---	ns
T_r	Rise Time		---	263	---	
$T_{d(off)}$	Turn-Off Delay Time		---	311	---	
T_f	Fall Time		---	222	---	
C_{iss}	Input Capacitance	V_{DS}=25V , V_{GS}=0V , f=1.0MHz	---	2926	---	pF
C_{oss}	Output Capacitance		---	371	---	
C_{rss}	Reverse Transfer Capacitance		---	219	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I_S [7]	Continuous Source Current		---	---	55	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=1A	---	---	1.4	V
t_{rr}	Reverse Recovery Time	I_F=20A , di/dt=500A/μs	---	220	---	ns
Q_{rr}	Reverse Recovery Charge		---	2.0	---	nC

Note:

1. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The Power dissipation P_{DSM} is based on $R_{\theta JA}$ t≤ 10s and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.
2. The power dissipation P_D is based on $T_{J(MAX)}$=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
3. Single pulse width limited by junction temperature $T_{J(MAX)}$=150°C.
4. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.
5. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.
6. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$=150°C. The SOA curve provides a single pulse rating.
7. The maximum current rating is package limited.
8. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C.
9. The maximum current rating is silicon limited

Typical Characteristics

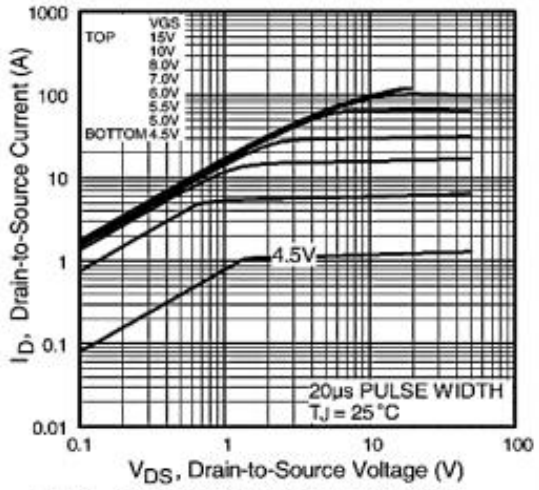


Fig 1. Typical Output Characteristics

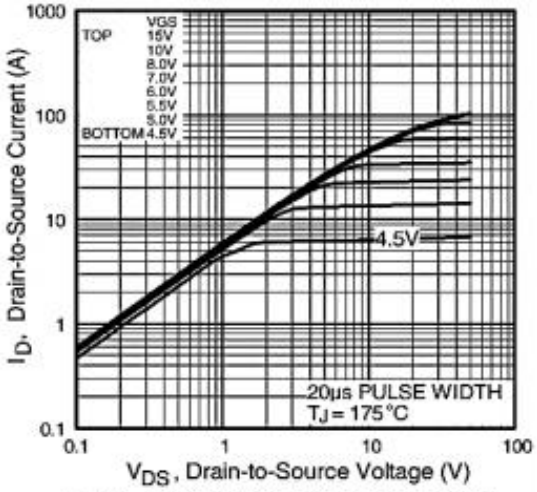


Fig 2. Typical Output Characteristics

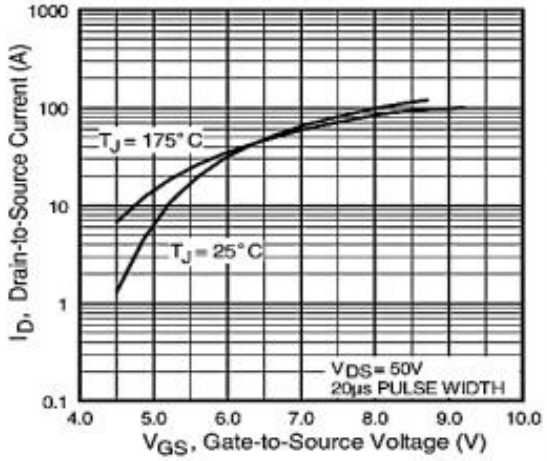


Fig 3. Typical Transfer Characteristics

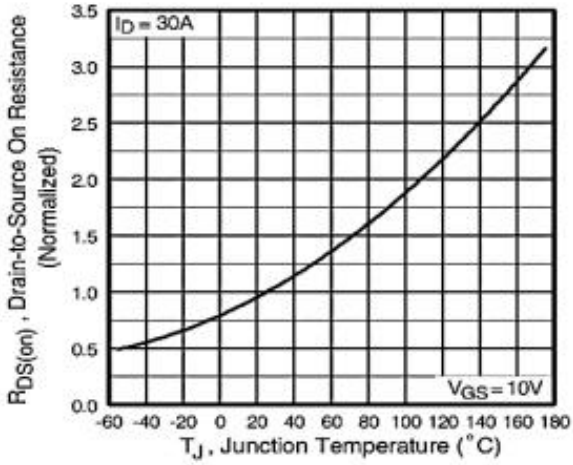


Fig 4. Normalized On-Resistance Vs. Temperature

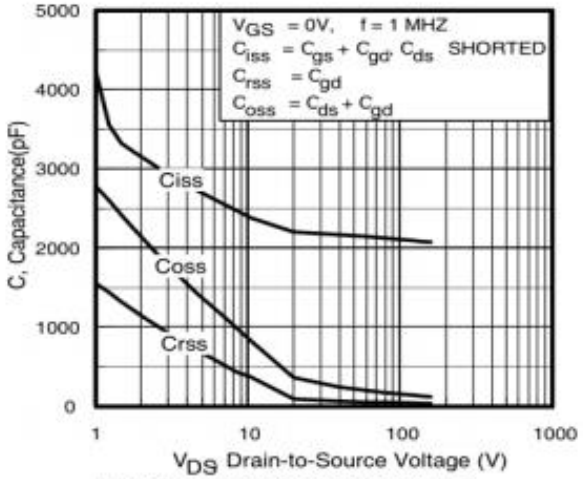


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

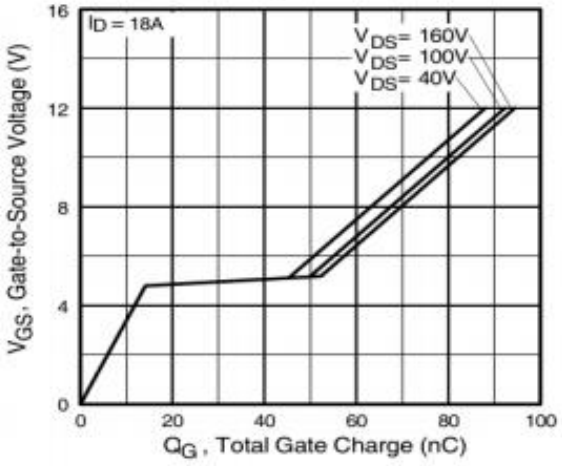


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

Typical Characteristics (Cont.)

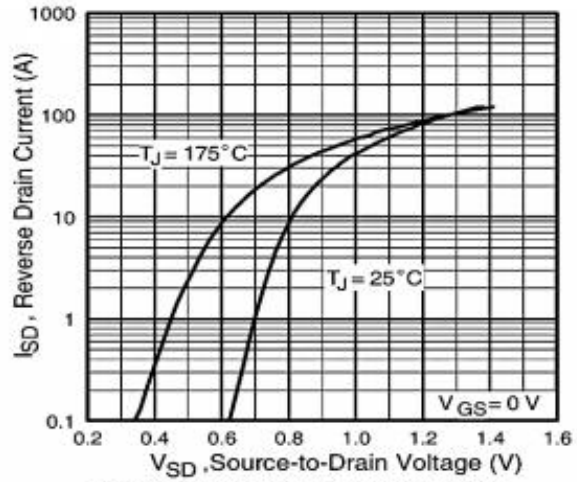


Fig 7. Typical Source-Drain Diode Forward Voltage

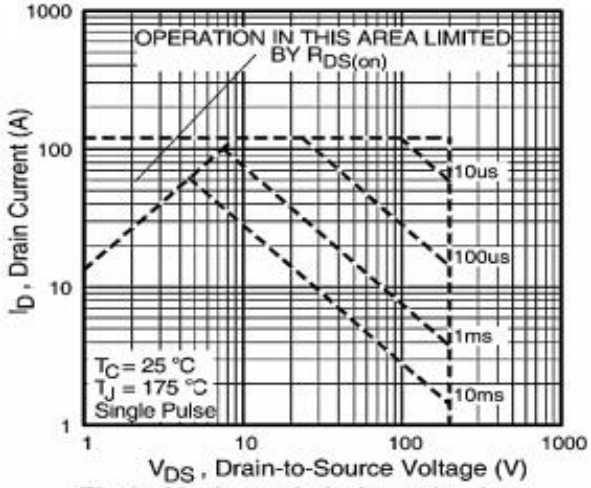


Fig 8. Maximum Safe Operating Area

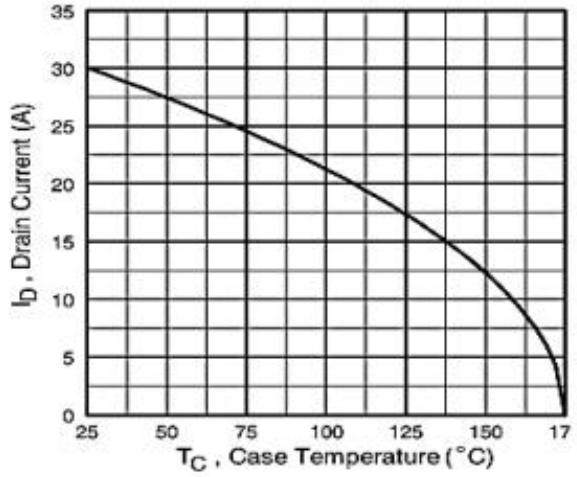


Fig 9. Maximum Drain Current Vs. Case Temperature

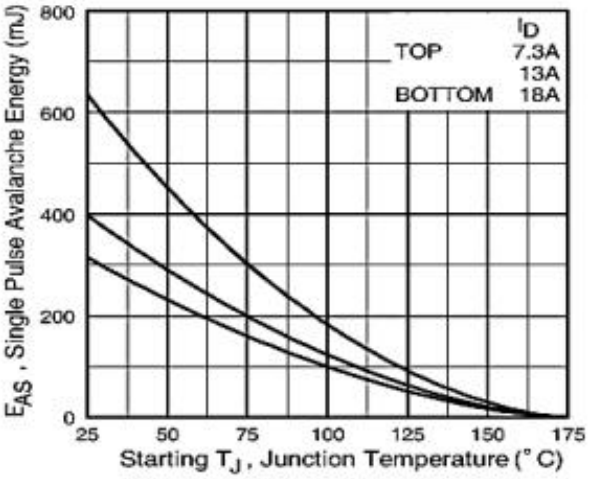


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

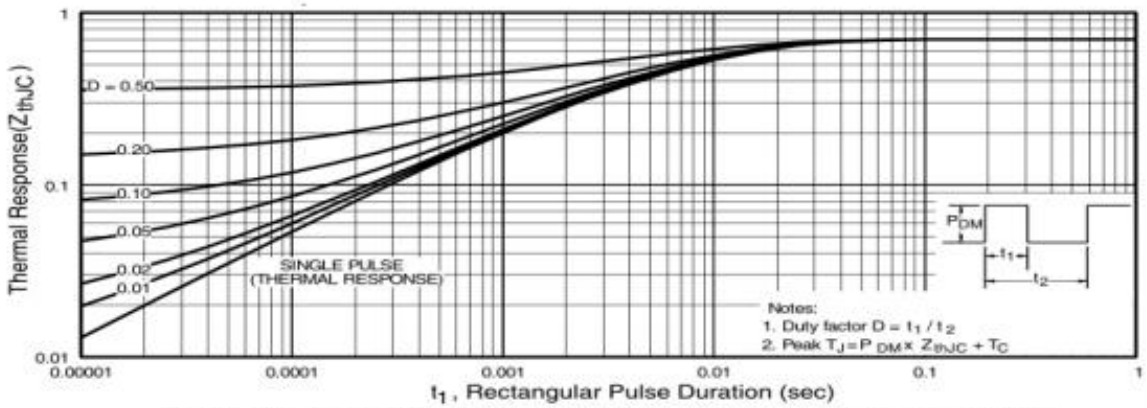
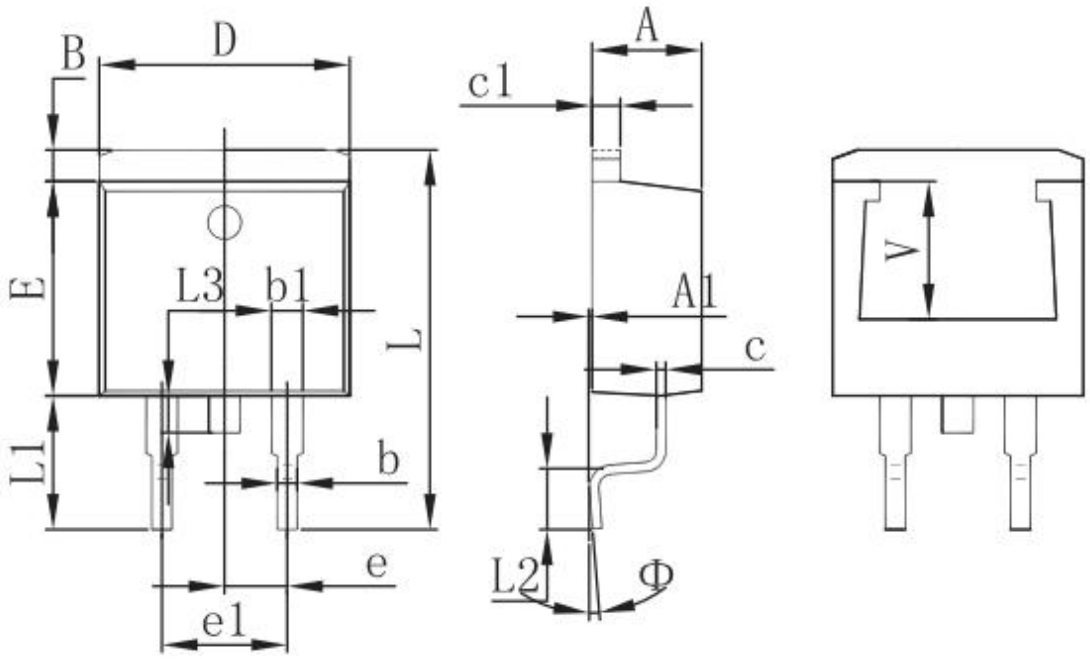


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

Packaging information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.470	4.670	0.176	0.184
A1	0.000	0.150	0.000	0.006
B	1.120	1.420	0.044	0.056
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
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
L	14.940	15.500	0.588	0.610
L1	4.950	5.450	0.195	0.215
L2	2.340	2.740	0.092	0.108
L3	1.300	1.700	0.051	0.067
Φ	0°	8°	0°	8°
V	5.600 REF.		0.220REF.	

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