N-Channel Enhancement Mode MOSFET

1. Product Information

Features

Self-aligned Planar Technology

Excellent switching performance

Low avalanche energy

Applications

Uninterruptible Power Supply(UPS)

Power Factor Correction (PFC)

Quick reference

V_{DS} = 200V

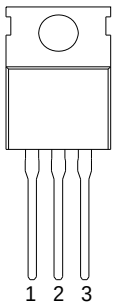
I_D = 40A

$R_{DS(ON)}$ ≦ 65mΩ @ V_{GS}= 10V（Type: 50 mΩ）

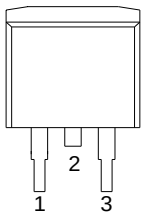
Pin Description

Pin	Description
1	Gate(G)
2	Drain(D)
3	Source(S)

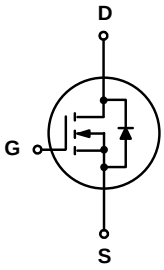
Simplified Outline	Symbol



Top View
TO-220



Top View
TO-263



Package Marking and Ordering Information

Product Name	Package	Marking	Reel Size	Tape Width	Quantity
KJ40N20C	TO-220-3L	40N20 XXXYYY XXXYYY: Date Code	-	-	1000
KJ40N20D	TO-263-3L		-	-	800

2. Absolute Maximum Ratings (T_J=25℃ unless otherwise noted)

Symbol	Parameter	Values	Unit
V_{DS}	Drain-Source Voltage	200	V
V_{GS}	Gate-Source Voltage	±30	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS}@10V	40	A
I_{DM}	Pulsed Drain Current	180	A
P_D@T_C=25℃	Power Dissipation	158	W
E_{AS}	Single Pulse Avalanche Energy	588	mJ
I_{AR}	Avalanche Current	28	A
E_{AR}	Repetitive Avalanche Current	15.8	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55~150	℃
T_L	Maximum Lead Temperature for Soldering Purposes	300	℃
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62	℃/ W
$R_{\theta JC}$	Thermal Resistance Junction-Case	1	℃/ W

3. Electrical Characteristics (T_J=25℃, unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	200	-	-	V
$V_{GS(th)}$	Gate-Threshold Voltage	V_{DS}=V_{GS}, I_D=250μA	2.0	3.0	4.0	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=200V, V_{GS}=0V T_C=25℃	-	-	1	μA
I_{GSS}	Gate-body Leakage current	V_{DS}=0V, V_{GS}=±30V	-	-	±100	nA
$R_{DS(on)}$	Drain-Source on-Resistance	V_{GS}=10V, I_D=14.0A	-	50	65	mΩ
gfs	Forward Transconductance S	V_{DS} = 40V, I_D=14.0A	-	24	-	S
C_{iss}	Input Capacitance	V_{DS}=25V, V_{GS}=0V, f=1MHz	-	2879	3742	pF
C_{oss}	Output Capacitance		-	362	470	
C_{rss}	Reverse Transfer Capacitance		-	51	105	
Q_g	Total Gate Charge	V_{GS}=10V, V_{DS}=160V, I_D=28A	-	103	-	nC
Q_{gs}	Gate-Source Charge		-	16	-	
Q_{gd}	Gate-Drain Charge		-	53	-	
t_d(on)	Turn-on Delay Time	V_{GS}=10V, V_{DD}=100V, R_G=25Ω, I_D=28A (Note 4, 5)	-	28	69	ns
t_r	Turn-on Rise Time		-	251	494	
t_d(off)	Turn-off Delay Time		-	309	617	
t_f	Turn-off Fall Time		-	220	412	
I_S	Diode Forward Current	T_C=25℃	-	-	28	A
I_{SM}	Pulsed Diode Forward Current		-	-	112	A
V_{SD}	Diode Forward Voltage	I_S=20A, V_{GS}=0V	-	-	1.3	V
t_{rr}	Body Diode Reverse Recovery Time	I_S=28A, V_{GS}=0V dI_F/dt=100A/μs	-	218	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge		-	1.91	-	nC

Notes:

1. The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.
2. The E_{AS} data shows Max. rating. L=1.5mH, I_{AS}=28A, V_{DD}=50V, RG=25Ω,Starting T_J=25℃.
3. The test condition is Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 1%.
4. The power dissipation is limited by 150℃ junction temperature.
5. The data is theoretically the same as I_D and I_{DM}, in real applications , should be limited by total power dissipation.

4.Typical Characteristics

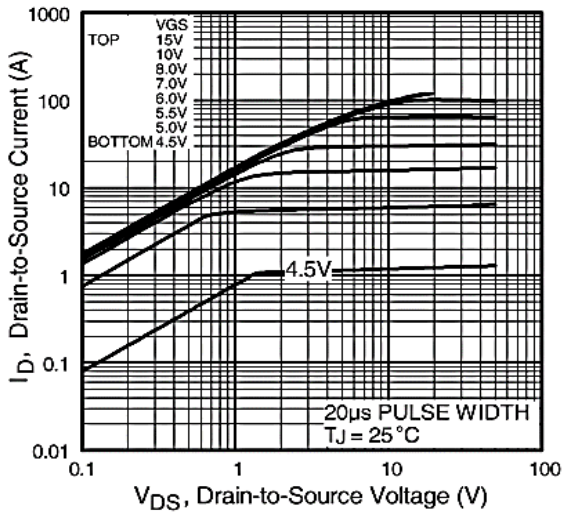


Fig 1. Typical Output Characteristics

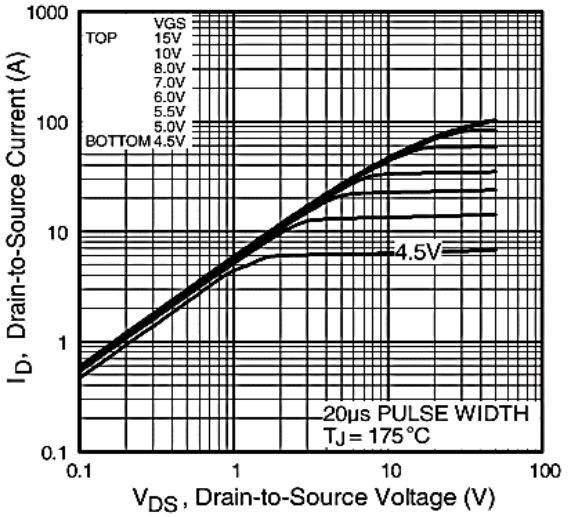


Fig 2. Typical Output Characteristics

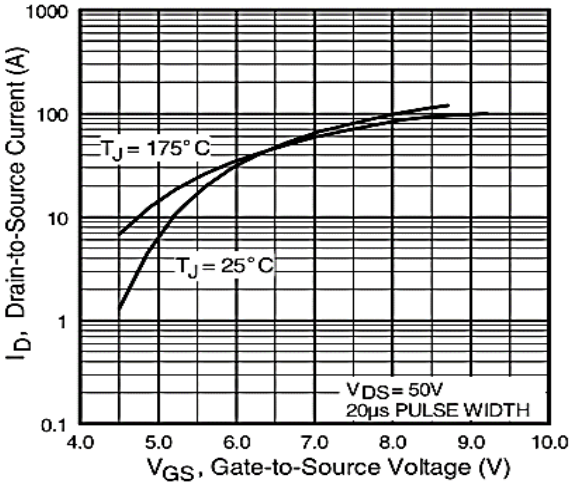


Fig 3. Typical Transfer Characteristics

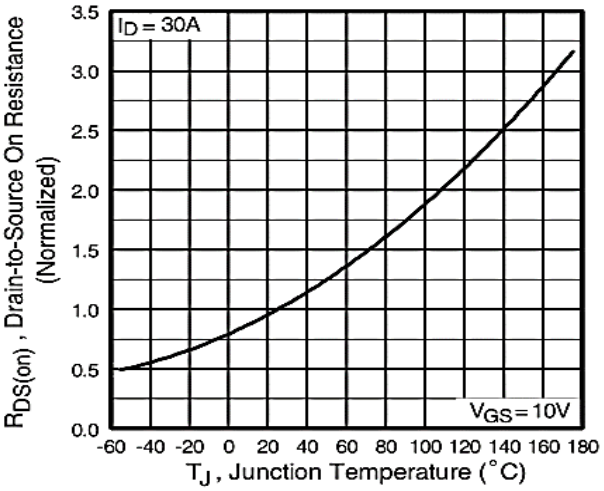


Fig 4. Normalized On-Resistance Vs. Temperature

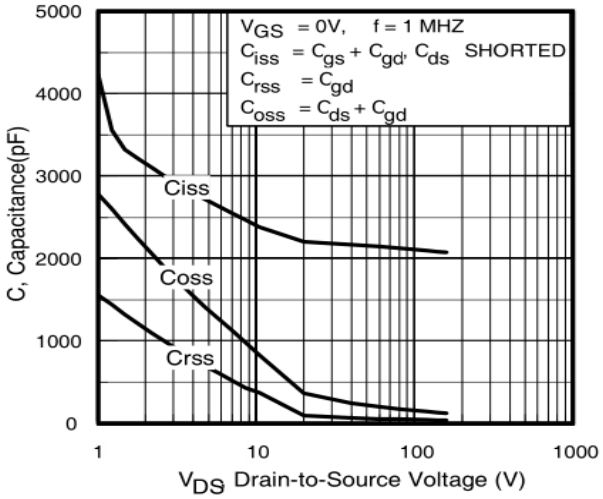


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

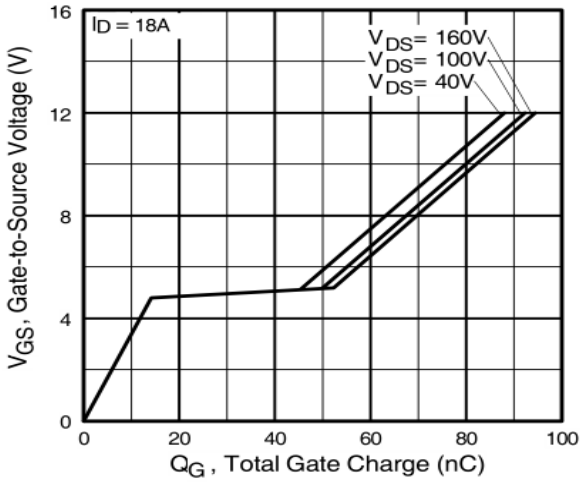


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

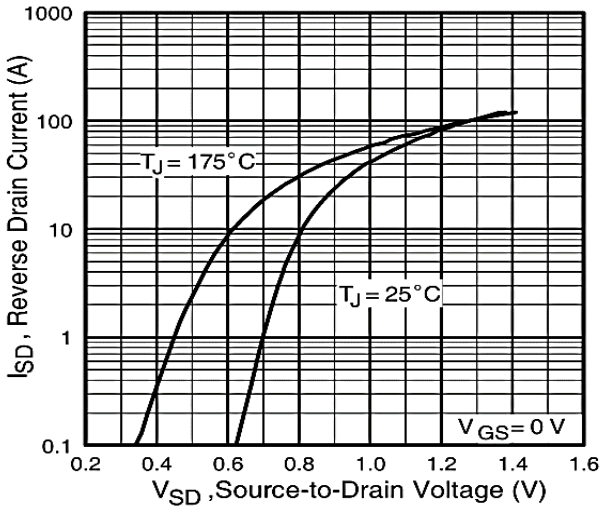


Fig 7. Typical Source-Drain Diode Forward Voltage

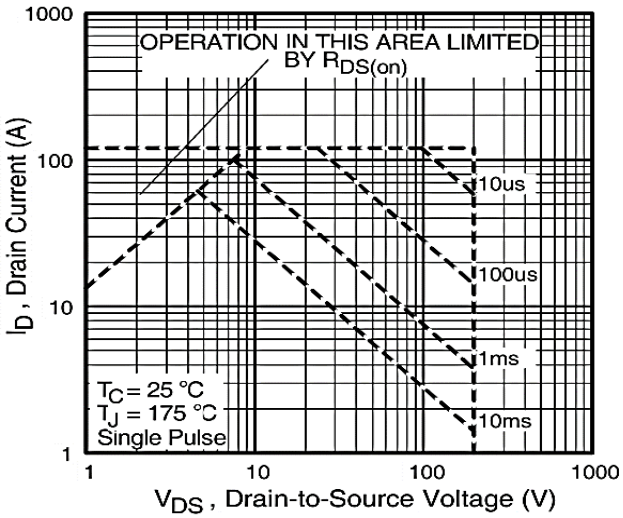


Fig 8. Maximum Safe Operating Area

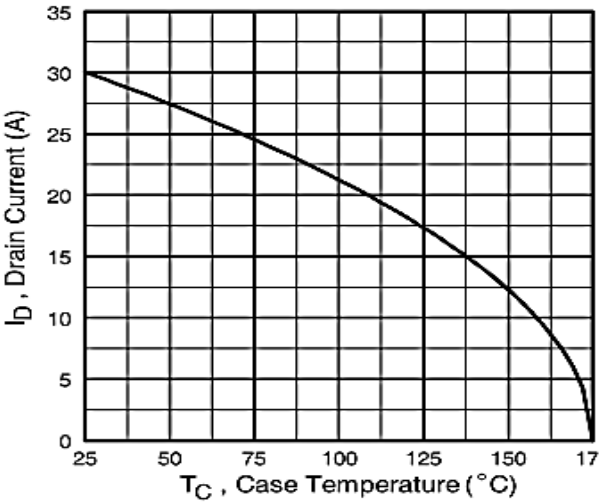


Fig 9. Maximum Drain Current Vs. Case Temperature

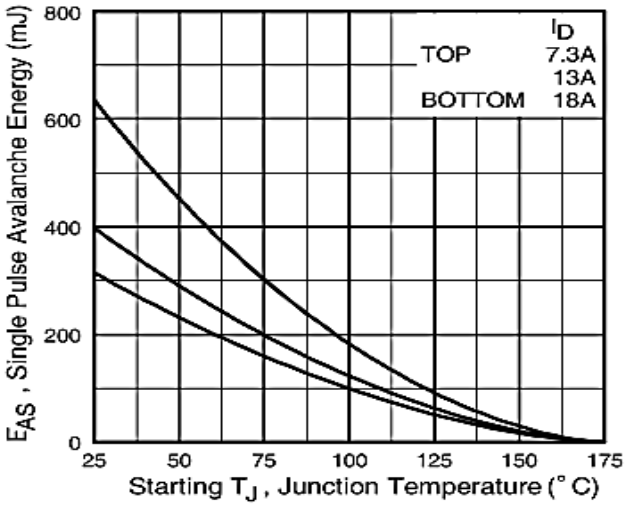


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

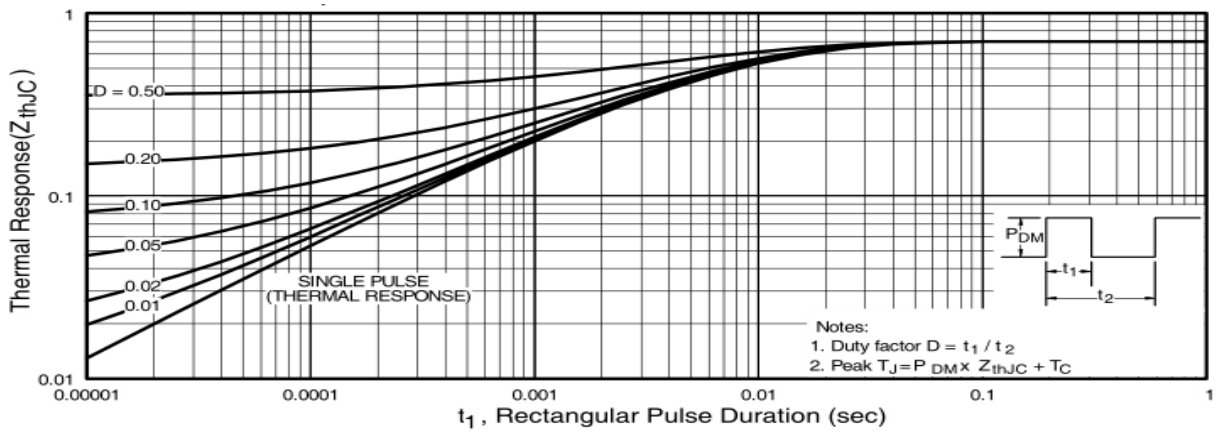
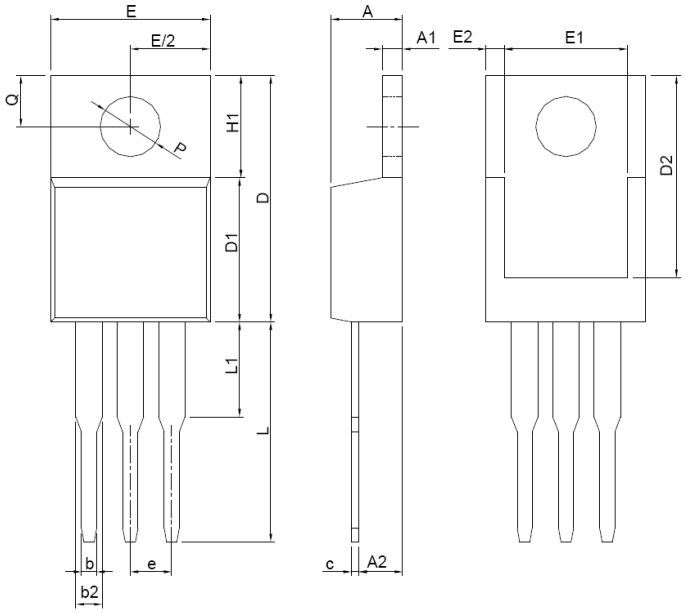


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

5.Package Mechanical Data

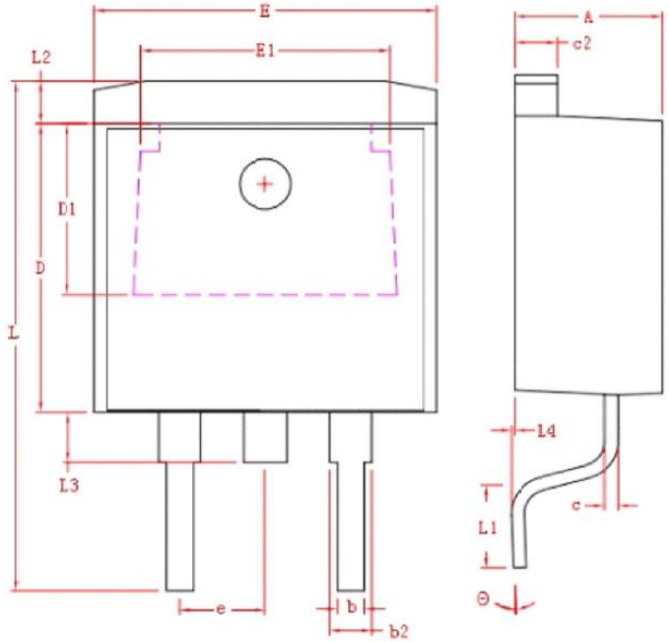
TO-220-3L



Symbol	Dimensions In Millimeters	
	MIN.	MAX.
A	3.56	4.83
A1	0.51	1.40
A2	2.03	2.92
b	0.38	1.02
b2	1.14	1.78
c	0.36	0.61
D	14.22	16.51
D1	8.38	9.02
D2	12.19	12.88
E	9.65	10.67
E1	6.86	8.89
E2	0.76BSC	
e	2.54BSC	
H1	5.84	6.86
L	12.70	14.73
L1	6.35BSC	
P	3.53	4.09
Q	2.54	3.43

5.Package Mechanical Data

TO-263-3L



Symbol	Dimensions In Millimeters	
	MIN.	MAX.
A	4.40	4.80
b	0.76	1.00
L4	0.00	0.25
C	0.36	0.50
L3	1.50 REF	
L1	2.29	2.79
E	9.80	10.40
E1	7.40 REF	
c2	1.25	1.45
b2	1.17	1.47
D	8.60	9.00
D1	5.10 REF	
e	2.54 REF	
L	14.6	15.8
θ	$0^\circ \pm 3^\circ$	
L2	1.27 REF	