

N-Channel Enhancement Mode MOSFET

1. Product Information

Features

- Advanced Trench Technology
- Excellent $R_{DS(ON)}$ and Low gate charge

Applications

- Uninterrupted Power Supply (UPS)
- Brushless DC electric motor (BLDC)

Quick reference

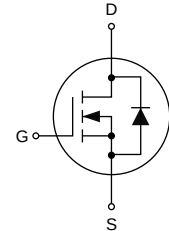
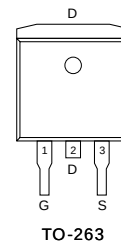
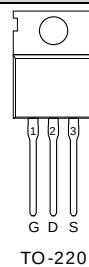
- $V_{DS} = 250\text{ V}$
- $I_D = 60\text{ A}$
- $R_{DS(ON)} \leq 33\text{ m}\Omega @ V_{GS}=10\text{ V (Type: 28 m}\Omega)$

Pin Description

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

Simplified Outline

Symbol



Package Marking and Ordering Information

Product Name	Package	Marking	Reel Size	Tape Width	Quantity
KJ60N25C	TO-220	KJ60N25C	N/A	N/A	1000
KJ60N25D	TO-263	KJ60N25D	13"	24 mm	800

2. Absolute Maximum Ratings ($T_J=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Values	Unit
V_{DS}	Drain-Source Voltage	250	V
V_{GS}	Gate-Source Voltage	± 30	V
I_D	Continuous Drain Current, $V_{GS}@10\text{V}$, $T_C=25^\circ\text{C}$	60	A
	Continuous Drain Current, $V_{GS}@10\text{V}$, $T_C=100^\circ\text{C}$	40	A
I_{DM}	Pulsed Drain Current	230	A
P_D	Power Dissipation, $T_C=25^\circ\text{C}$	360	W
E_{AS}	Single Pulse Avalanche Energy	300	mJ
E_{AR}^1	Avalanche Energy, Repetitive	75	mJ
I_{AR}^1	Avalanche Current	45	A
dv/dt^2	Peak Diode Recovery dv/dt	5.0	V/ns
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55~150	$^\circ\text{C}$
T_L	Maximum Temperature for Soldering	300	$^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	60	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance, Junction-Case	0.45	$^\circ\text{C/W}$

3. Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{DS}	Drain-Source Breakdown Voltage	$V_{GS}=0\text{ V}$, $I_D=250\text{ }\mu\text{A}$	250	-	-	V
$V_{GS(th)}$	Gate-Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=250\text{ }\mu\text{A}$	3.6	-	5.0	V
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=250\text{ V}$, $V_{GS}=0\text{ V}$, $T_A=25^{\circ}\text{C}$	-	-	1	μA
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=250\text{ V}$, $V_{GS}=0\text{ V}$, $T_A=125^{\circ}\text{C}$	-	-	100	μA
I_{GSS}	Gate-body Leakage current	$V_{DS}=0\text{ V}$, $V_{GS}=\pm 20\text{ V}$	-	-	± 100	nA
$R_{DS(on)}$	Drain-Source on-Resistance	$V_{GS}=10\text{ V}$, $I_D=35\text{ A}$	-	28	33	m Ω
G_{fs}	Forward Trans conductance	$V_{GS}=10\text{ V}$, $I_D=35\text{ A}$	100	-	-	S
R_G	Gate Resistance	$V_{GS}=0\text{ V}$, V_{DS} open, $f=1.0\text{ MHz}$	-	1.5	-	Ω
C_{iss}	Input Capacitance	$V_{DS}=25\text{ V}$, $V_{GS}=0\text{ V}$, $f=1\text{ MHz}$	-	7000	-	pF
C_{oss}	Output Capacitance		-	480	-	
C_{rss}	Reverse Transfer Capacitance		-	210	-	
$t_{d(on)}$	Turn-on Delay Time	$V_{GS}=10\text{ V}$, $V_{DS}=50\text{ V}$, $R_G=2.5\text{ }\Omega$, $I_D=35\text{ A}$	-	45	-	ns
t_r	Turn-on Rise Time		-	70	-	
$t_{d(off)}$	Turn-off Delay Time		-	110	-	
t_f	Turn-off Fall Time		-	90	-	
Q_g	Total Gate Charge	$V_{GS}=10\text{ V}$, $V_{DD}=100\text{ V}$, $I_D=35\text{ A}$	-	200	-	nC
Q_{gs}	Gate-Source Charge		-	28	-	
Q_{gd}	Gate-Drain Charge		-	60	-	
I_{SD}	Continuous Source Current (Body Diode)		-	-	50	A
I_{SM}	Maximum Pulsed Current (Body Diode)		-	-	180	A
V_{SD}	Diode Forward Voltage	$I_S=35\text{ A}$, $V_{GS}=0\text{ V}$	-	-	1.2	V
t_{rr}	Reverse Recovery Time	$I_S=30\text{ A}$, $V_{DD}=50\text{ V}$, $V_{GS}=0\text{ V}$, $dI_F/dt=100\text{ A}/\mu\text{s}$	-	120	-	ns
Q_{rr}	Reverse Recovery Charge		-	0.55	-	nC

Notes:

1. The data tested by surface mounted on a 1 inch² FR-4 board with 2 OZ copper.
2. The E_{AS} data shows Max. rating. $I_{AS}=35\text{ A}$, $R_G=25\text{ }\Omega$, $V_{DD}=50\text{ V}$, $V_{GS}=10\text{ V}$, Starting $T_J=25^{\circ}\text{C}$.
3. The test condition is Pulse Test: Pulse width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 1\%$.
4. The power dissipation is limited by 150°C 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

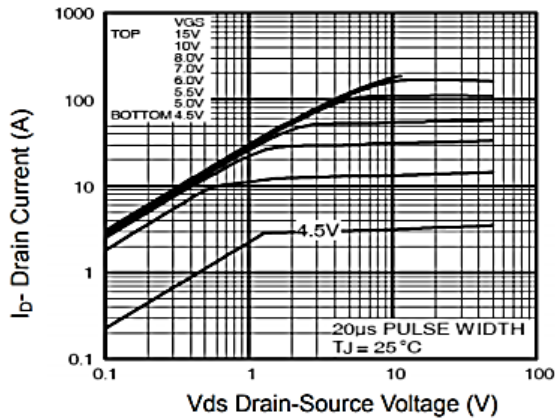


Figure 1 Output Characteristics

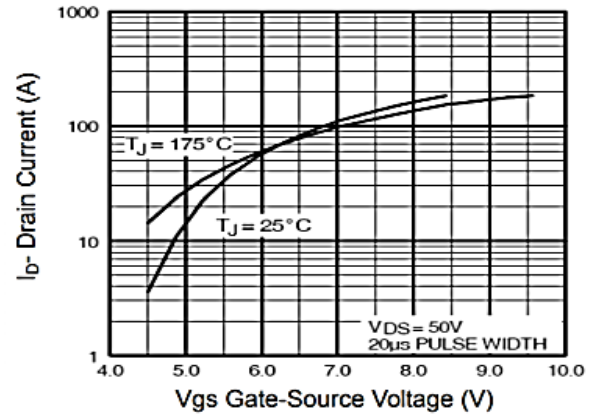


Figure 2 Transfer Characteristics

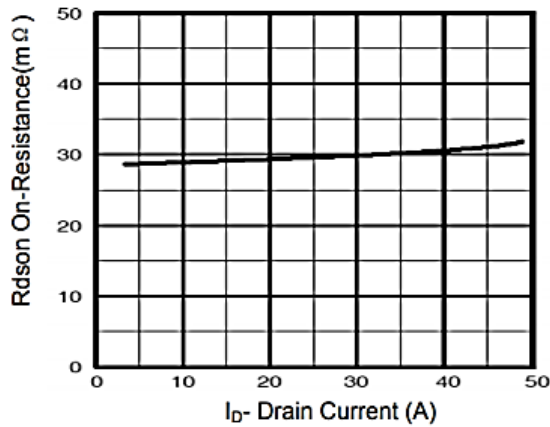


Figure 3 Rdson- Drain Current

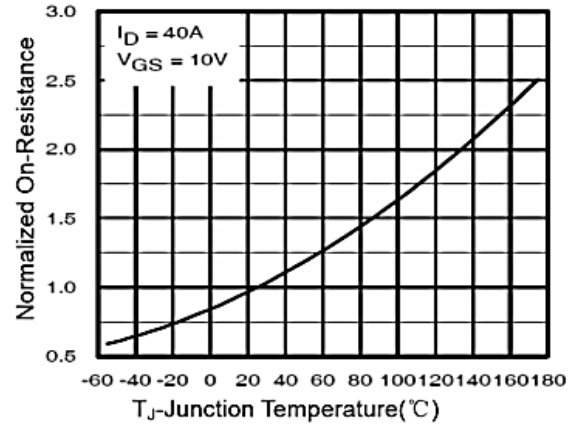


Figure 4 Rdson-Junction Temperature

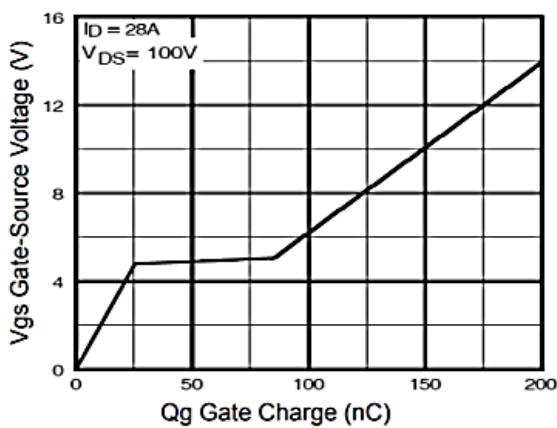


Figure 5 Gate Charge

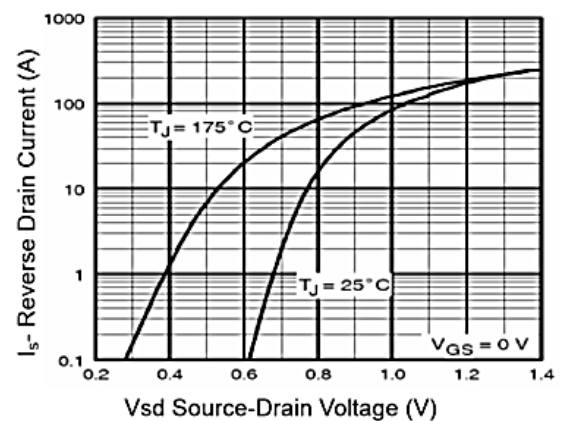


Figure 6 Source- Drain Diode Forward

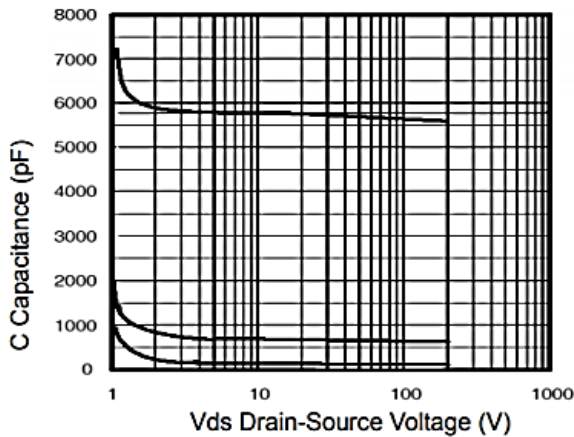


Figure 7 Capacitance vs Vds

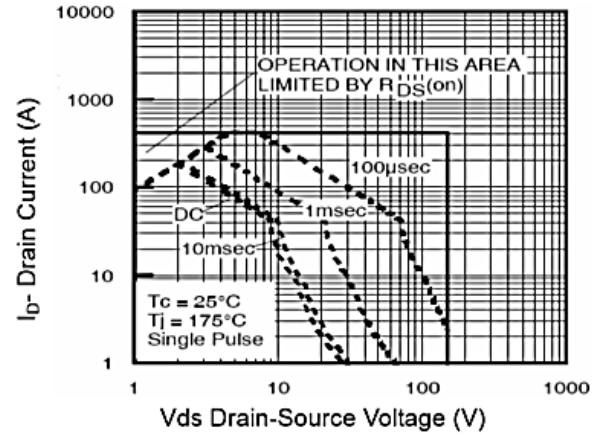


Figure 8 Safe Operation Area

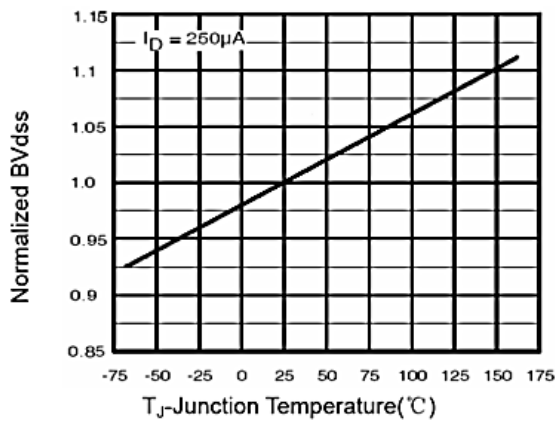


Figure 9 BVdss vs Junction Temperature

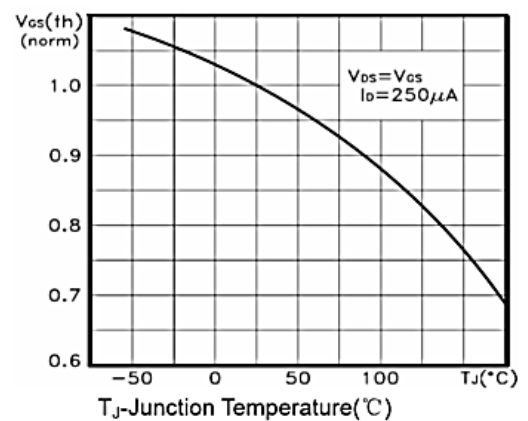


Figure 10 VGS(th) vs Junction Temperature

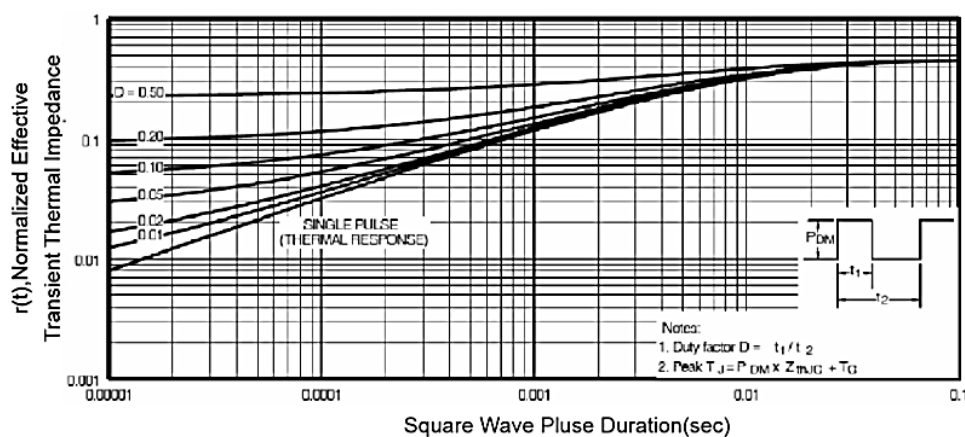
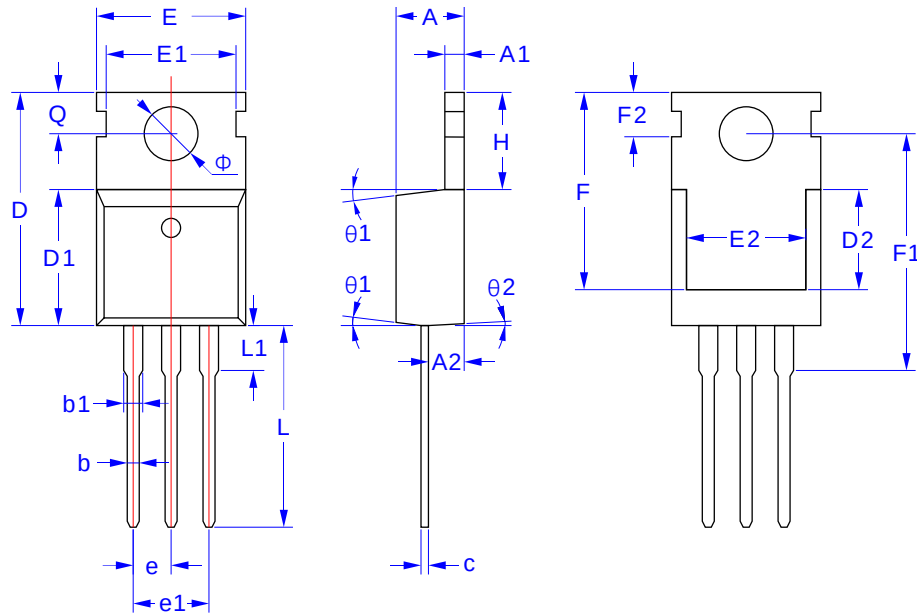


Figure 11 Normalized Maximum Transient Thermal Impedance

5. Package Mechanical Data

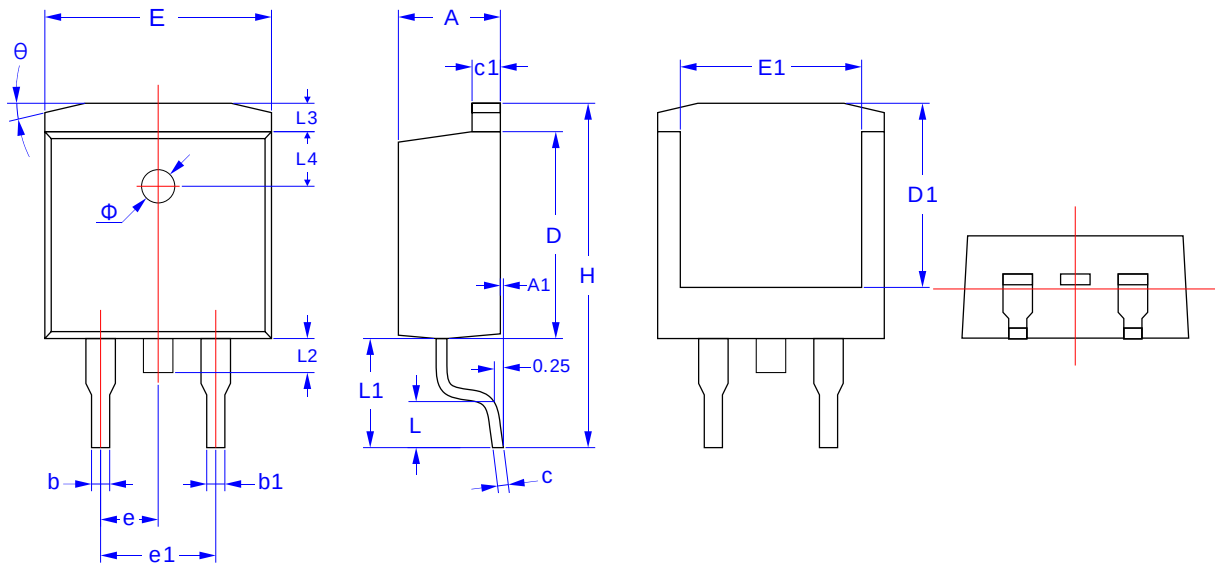
TO-220 Package



Symbol	Dimensions in Millimeters		
	MIN.	NOM.	MAX.
A	4.27	4.57	4.87
A1	1.15	1.30	1.45
A2	2.10	2.40	2.70
b	0.70	0.80	1.00
b1	1.17	1.27	1.50
c	0.40	0.50	0.65
D	15.50	15.80	16.10
D1	8.80	9.10	9.40
D2	5.70	6.70	7.00
E	9.70	10.00	10.30
E1	-	8.70	-
E2	7.00	8.00	8.40
e	2.54		
e1	5.08		
F	13.30	13.50	13.70
F1	15.50	15.90	16.30
F2	2.80	3.00	3.20
H	6.00	6.50	6.85
L	12.75	13.50	13.90
L1	-	3.10	3.40
Q	2.60	2.80	3.00
Φ	3.45	3.60	3.75
θ1	4°	7°	10°
θ2	0°	3°	6°

5. Package Mechanical Data

TO-263 Package



TOP VIEW

SIDE VIEW

BOTTOM VIEW

SIDE VIEW

Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	4.30	4.70
A1	0.00	0.25
b	0.70	0.90
b1	1.20	1.40
c	0.40	0.55
c1	1.25	1.35
D	9.00	9.20
D1	8.00	8.20
E	9.80	10.20
E1	7.85	8.15

Symbol	Dimensions in Millimeters	
	MIN.	MAX.
e	2.54 BSC	
e1	4.93	5.23
H	14.90	15.20
L	2.00	2.45
L1	4.60	5.00
L2	1.30	1.70
L3	1.15	1.35
L4	2.40	2.60
Φ	1.50 REF	
θ	13° TYP	