

N-Channel Enhancement Mode MOSFET

1. Product Information

1.1 Features

- ☒ Advanced trench cell design
- ☒ Low thermal resistance

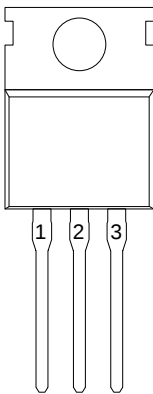
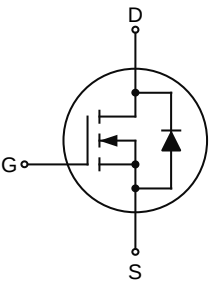
1.2 Applications

- ☒ Motor drivers
- ☒ DC/DC converter

1.3 Quick reference

- ☒ $BV \geq 40\text{ V}$
- ☒ $P_D \leq 166\text{ W}$
- ☒ $I_D \leq 280\text{ A}$
- ☒ $R_{DS(ON)} \leq 1.4\text{ m}\Omega @V_{GS} = 10\text{ V}$
- ☒ $R_{DS(ON)} \leq 2.5\text{ m}\Omega @V_{GS} = 4.5\text{ V}$

2. Pin Description

Pin	Description	Simplified Outline	Symbol
1	Gate (G)	 Top View TO-220	
2	Drain (D)		
3	Source (S)		

3. Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	Drain-Source Voltage	$T_C=25^{\circ}\text{C}$	40	-	V
V_{GS}	Gate-Source Voltage	$T_C=25^{\circ}\text{C}$	-	± 20	V
I_D^{***}	Drain Current (DC)	$T_C=25^{\circ}\text{C}, V_{GS}=10\text{ V}$	-	280	A
		$T_C=100^{\circ}\text{C}, V_{GS}=10\text{ V}$	-	190	A
$I_{DM}^{*, ***}$	Drain Current (Pulsed)	$T_C=25^{\circ}\text{C}, V_{GS}=10\text{ V}$	-	980	A
P_D	Drain Power Dissipation	$T_C=25^{\circ}\text{C}$	-	166	W
I_S	Continuous-Source Current	$T_C=25^{\circ}\text{C}$	-	280	A
E_{AS}	Single Pulsed Avalanche Energy	$V_{DD}=20\text{V}, L=0.5\text{ mH}, T_J=25^{\circ}\text{C}$	-	1250	mJ
T_J, T_{stg}	Operating Junction and Storage Temperature Range		-55	150	$^{\circ}\text{C}$
$R_{\theta JA}^{**}$	Thermal Resistance-Junction to Ambient		-	62.5	$^{\circ}\text{C/W}$
$R_{\theta JC}^{**}$	Thermal Resistance-Junction to Case		-	0.75	

Notes:

- * Pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- ** Mounted on large heat sink.
- *** Limited by bonding wire.

4. Marking Information

Product Name	Marking
KJ013N04C	KJ013N04C XXXXXX-X

5. Ordering Code

Product Name	Package	Reel size	Tape width	Quantity (pcs)
KJ013N04C	TO-220	N/A	N/A	1000

Note: KUAJIEXIN defines "Green" as lead-free (RoHS compliant) and halogen free (Br or Cl does not exceed 900 ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500 ppm by weight; Follow IEC 61249-2-21 and IPC/JEDEC J-STD-020C).

6. Electrical Characteristics (T_A=25°C unless otherwise noted)

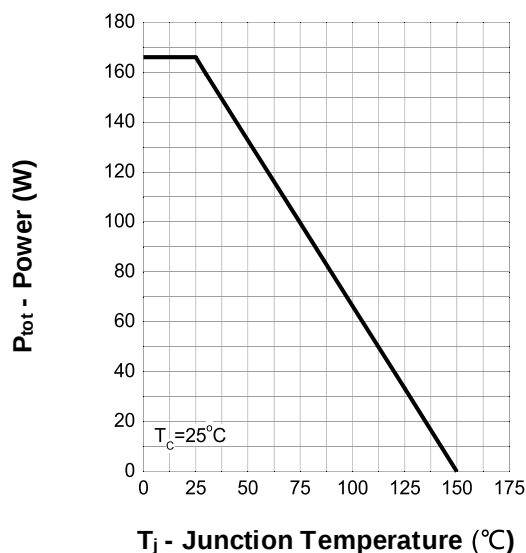
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0 V, I _{DS} =250 μA	40	-	-	V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250 μA	1	-	2.5	V
I _{DSS}	Drain Leakage Current	V _{DS} =40 V, V _{GS} =0 V	-	-	1	μA
I _{GSS}	Gate Leakage Current	V _{DS} =0 V, V _{GS} =±20 V	-	-	±100	nA
R _{DS(ON)} ^a	On-State Resistance	V _{GS} =10 V, I _{DS} =30 A	-	1.2	1.4	mΩ
		V _{GS} =4.5 V, I _{DS} =20 A	-	2.0	2.5	
Diode Characteristics						
V _{SD} ^a	Diode Forward Voltage	I _{SD} =20 A, V _{GS} =0 V	-	0.7	1.3	V
t _{rr}	Reverse Recovery Time	I _{DS} =20 A, V _{GS} =0 V, dI _{SD} /dt=100 A/μs	-	56	-	ns
Q _{rr}	Reverse Recovery Charge		-	84	-	nC
Dynamic Characteristics ^b						
C _{iss}	Input Capacitance	V _{GS} =0 V, V _{DS} =20 V, f=1 MHz	-	9600	-	pF
C _{oss}	Output Capacitance		-	900	-	
C _{rss}	Reverse Transfer Capacitance		-	90	-	
t _{d(on)}	Turn-on Delay Time	V _{DS} =20 V, V _{GEN} =10 V, R _G =4.5 Ω, R _L =1 Ω, I _{DS} =20 A	-	21	-	ns
t _r	Turn-on Rise Time		-	32	-	
t _{d(off)}	Turn-off Delay Time		-	35	-	
t _f	Turn-off Fall Time		-	16	-	
Gate Charge Characteristics ^b						
Q _g	Total Gate Charge	V _{DS} =20 V, V _{GS} =10 V, I _{DS} =20 A	-	163	-	nC
Q _{gs}	Gate-Source Charge		-	48	-	
Q _{gd}	Gate-Drain Charge		-	26	-	

Notes:

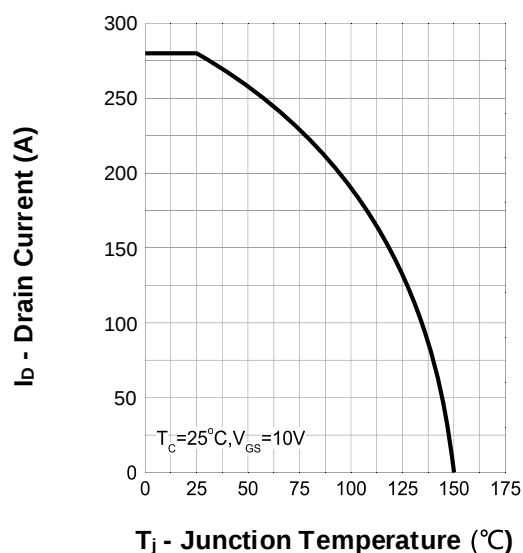
- Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
- Guaranteed by design, not subject to production testing.

7. Typical Characteristics

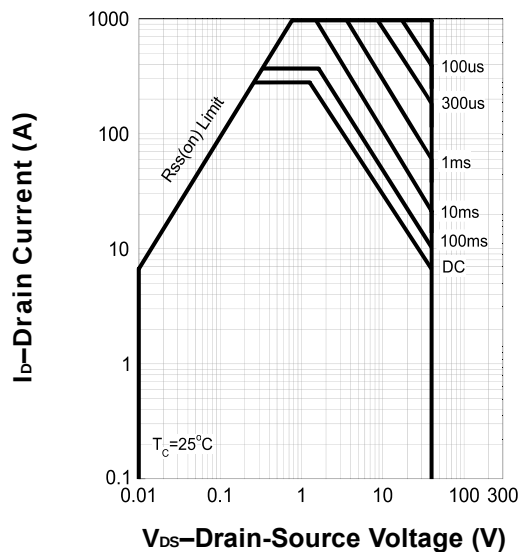
Power Capability



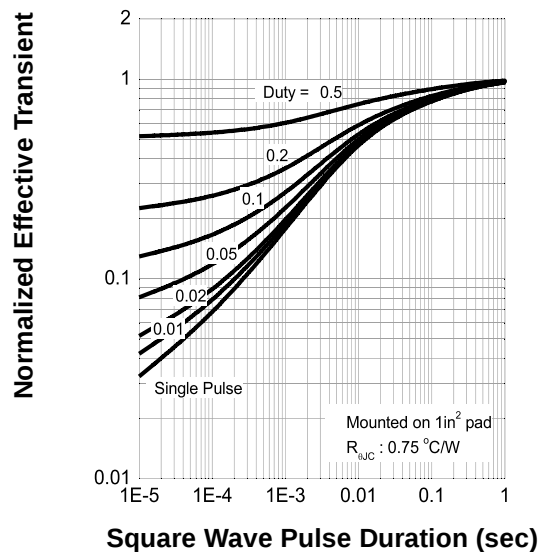
Current Capability



Safe Operating Area

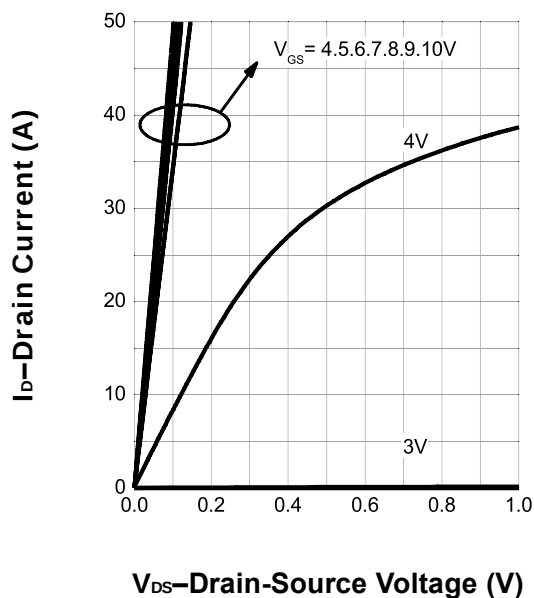


Thermal Transient Impedance

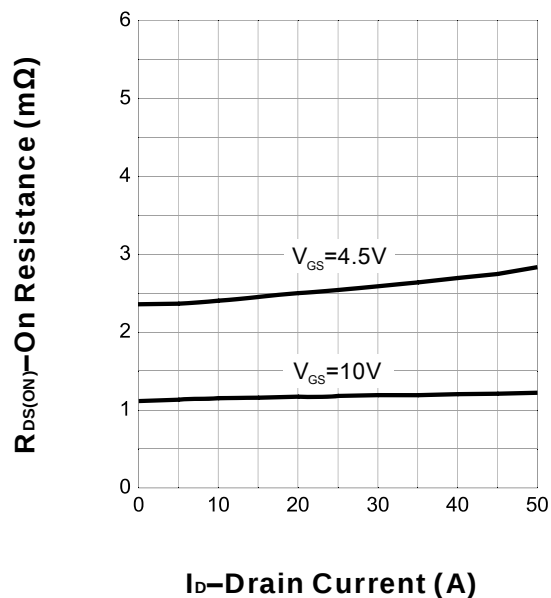


7. Typical Characteristics (cont.)

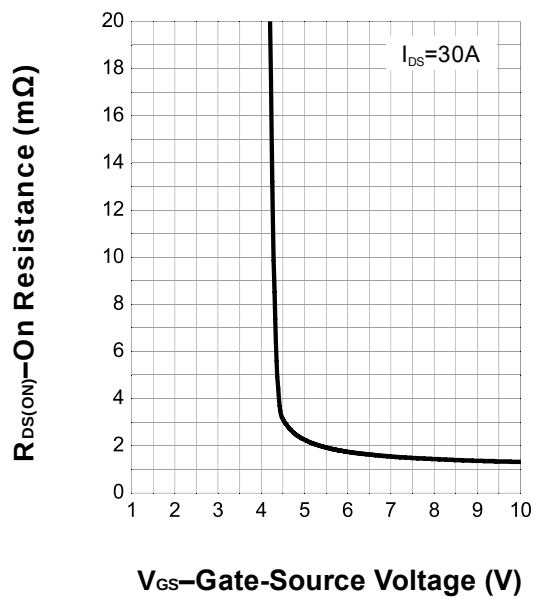
Output Characteristics



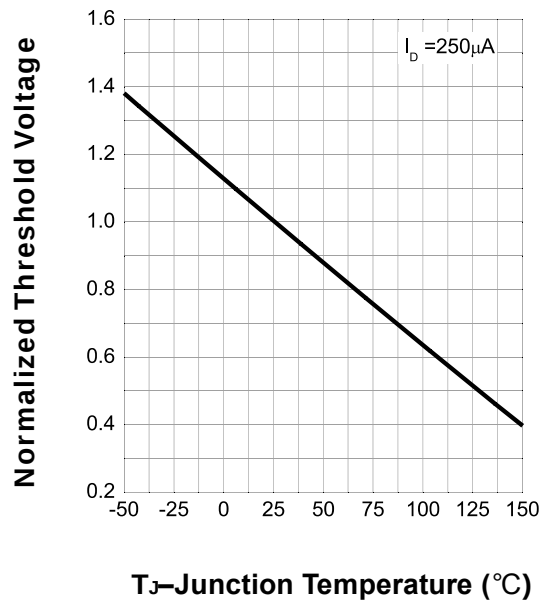
On Resistance



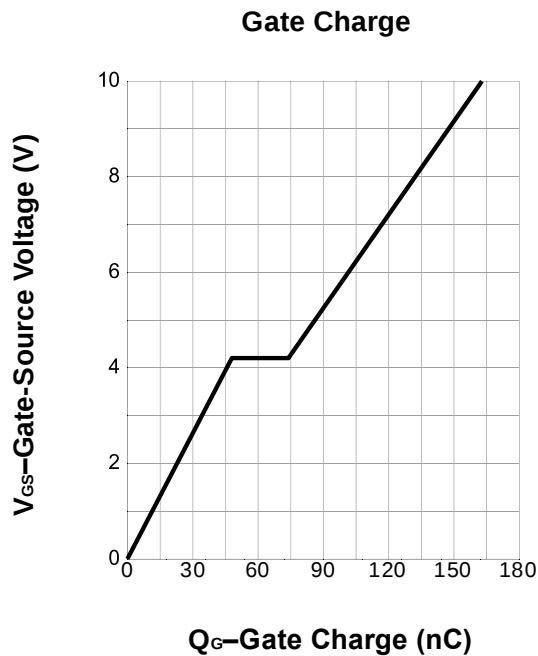
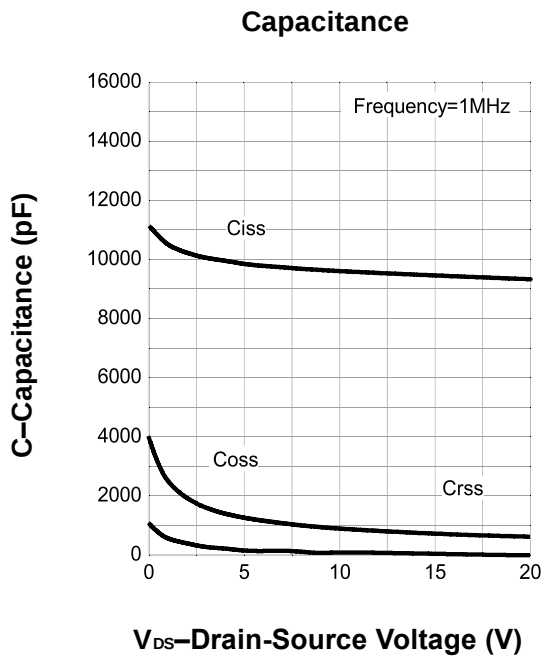
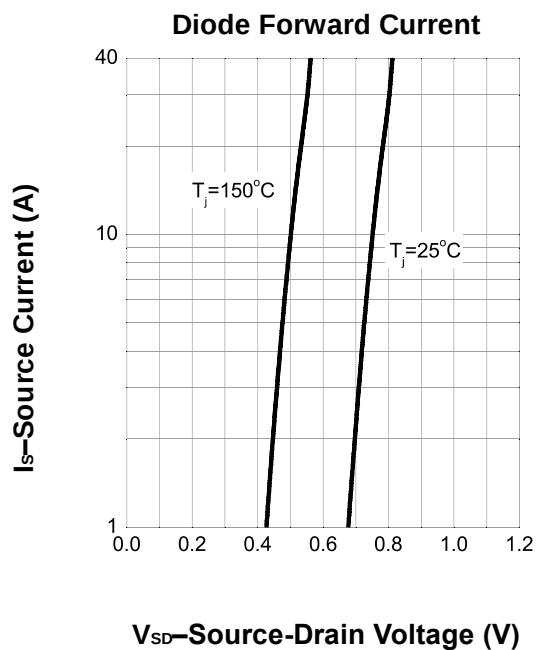
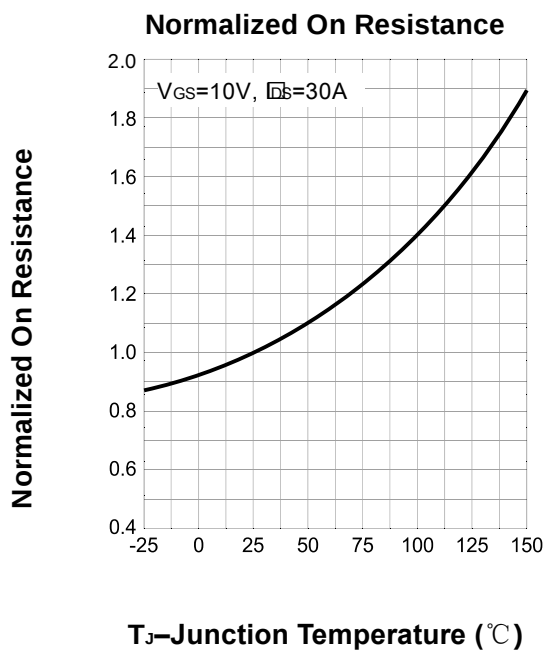
Transfer Characteristics



Normalized Threshold Voltage

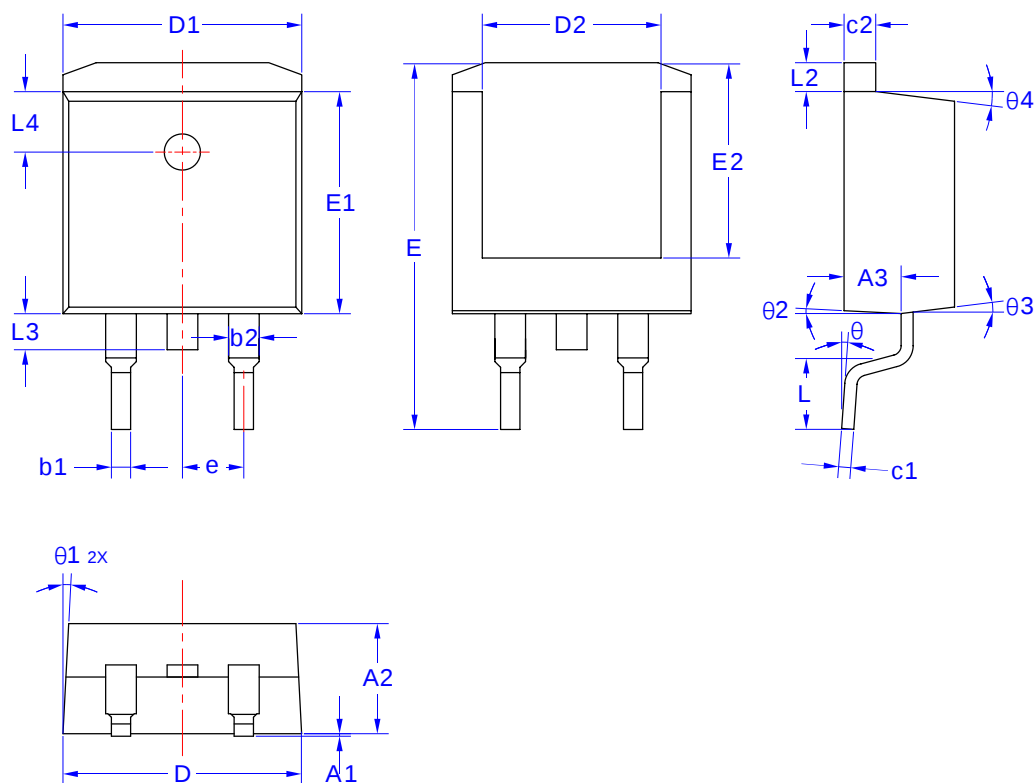


7. Typical Characteristics (cont.)



8. Package Dimensions

TO-263 Package



Symbol	Dimensions in Millimeters		
	MIN	NOM	MAX
A1	0.020	-	0.200
A2	4.470	4.570	4.670
A3	2.300	2.350	2.400
b1	0.750	-	0.850
b2	1.220	-	1.320
c1	0.500	-	0.550
c2	1.300	-	1.350
D	9.780	9.880	9.980
D1		9.880 REF	
D2		7.400 REF	
E	14.900	15.100	15.300
E1	9.100	9.200	9.300

Symbol	Dimensions in Millimeters		
	MIN	NOM	MAX
E2		8.100 REF	
e		5.540 REF	
L	2.100	2.300	2.500
L2	1.025	-	1.375
L3	1.300	1.500	1.700
L4	2.400	2.500	2.600
θ		0~8°	
$\theta 1$		3°	
$\theta 2$		3°	
$\theta 3$		7°	
$\theta 4$		7°	