

N-Channel Enhancement Mode MOSFET

1. Product Information

1.1 Features

- ✓ Surface-mounted package
- ✓ Low $R_{DS(ON)}$
- ✓ Low thermal impedance
- ✓ 100% avalanche tested

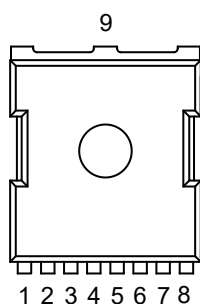
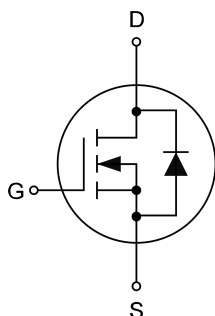
1.2 Applications

- ✓ Motor drives
- ✓ Power switch
- ✓ DC/DC conversion
- ✓ Light electric vehicles

1.3 Quick reference

- ✓ $BV \geq 40\text{ V}$
- ✓ $P_D \leq 167\text{ W}$
- ✓ $I_D \leq 300\text{ A}$
- ✓ $R_{DS(ON)} \leq 1.0\text{ m}\Omega @V_{GS} = 10\text{ V}$
- ✓ $R_{DS(ON)} \leq 1.6\text{ m}\Omega @V_{GS} = 4.5\text{ V}$

2. Pin Description

Pin	Description	Simplified Outline	Symbol
1	Gate	 Top View TOLL-8L	
2,3,4,5,6,7,8	Source		
9	Drain		

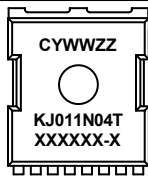
3. Limiting Values

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	Continuous Drain Current	$T_C=25^{\circ}\text{C}, V_{GS}=10\text{ V}$	-	300	A
		$T_C=100^{\circ}\text{C}, V_{GS}=10\text{ V}$	-	190	A
		$T_A=25^{\circ}\text{C}, V_{GS}=10\text{ V}$	-	40	A
I_{DM}^*	Pulsed Drain Current	$T_A=25^{\circ}\text{C}, V_{GS}=10\text{ V}$	-	1200	A
E_{AS}	Single Pulsed Avalanche Energy	$L=0.5\text{ mH}$	-	1056	mJ
P_D	Drain Power Dissipation	$T_C=25^{\circ}\text{C}$	-	167	W
		$T_A=25^{\circ}\text{C}$	-	3.1	W/ $^{\circ}\text{C}$
T_J, T_{stg}	Operating Junction and Storage Temperature Range		-55	150	$^{\circ}\text{C}$
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient, Steady-State		-	40	$^{\circ}\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance-Junction to Case, Steady-State		-	0.75	

Notes:

- * Surface mounted on minimum footprint pad area.
- ** Pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- *** Limited by bonding wire.

4. Marking Information

Product Name	Marking
KJ011N04T	

5. Ordering Code

Product Name	Package	Reel size	Tape width	Quantity (pcs)
KJ011N04T	TOLL-8L	13"	24 mm	2000

Note: KJ011N04T 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_J=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} =1 mA	40	-	-	V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250 μA	1	1.6	2.2	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)}	On-State Resistance	V _{GS} =10 V, I _{DS} =20 A	-	0.84	1.0	mΩ
		V _{GS} =4.5 V, I _{DS} =20 A	-	1.3	1.6	mΩ
g _{fs}	Forward transconductance	V _{GS} =5V, I _{DS} =20 A	-	350	-	S
R _g	Gate resistance	f=1 MHz, open drain	-	3	-	Ω
Diode Characteristics						
V _{SD}	Diode Forward Voltage	V _{GS} =0 V, I _{SD} =20 A	-	-	1.1	V
t _{rr}	Reverse Recovery Time	V _{DS} =20 V, I _{SD} =20 A, dI _{SD} /dt=100 A/μs	-	65	-	ns
Q _{rr}	Reverse Recovery Charge		-	65	-	nC
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =20 V, V _{GS} =0 V, f=1 MHz	-	5870	-	pF
C _{oss}	Output Capacitance		-	2360	-	
C _{rss}	Reverse Transfer Capacitance		-	92	-	
t _{d(on)}	Turn-on Delay Time	V _{DS} =20 V, V _{GEN} =10 V, R _G =4.7 Ω, I _{DS} =20 A	-	26	-	ns
t _r	Turn-on Rise Time		-	104	-	
t _{d(off)}	Turn-off Delay Time		-	112	-	
t _f	Turn-off Fall Time		-	36	-	
Gate Charge Characteristics						
Q _g	Total Gate Charge	V _{DS} =20 V, V _{GS} =10 V, I _{DS} =20 A	-	88	-	nC
Q _{gs}	Gate-Source Charge		-	22	-	
Q _{gd}	Gate-Drain Charge		-	17	-	

7. Typical Characteristics

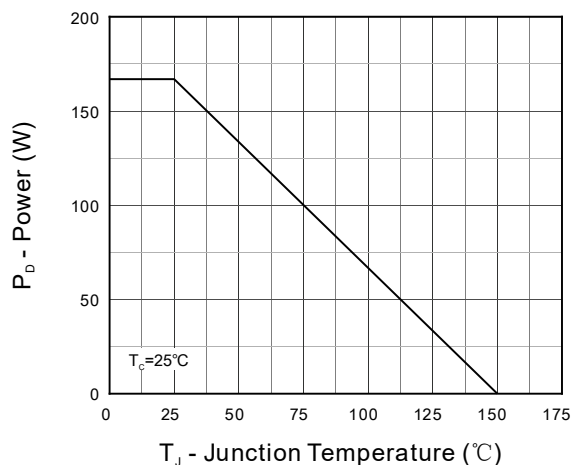


Figure 1. Power Capability

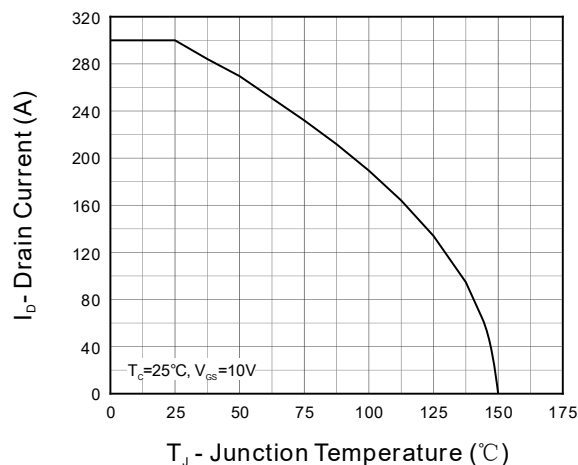


Figure 2. Current Capability

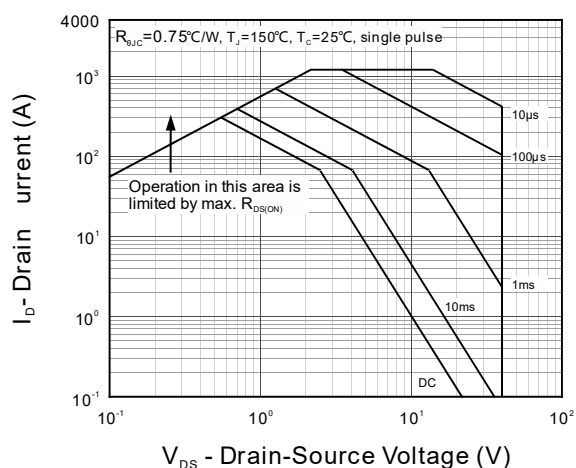


Figure 3. Safe Operation Area

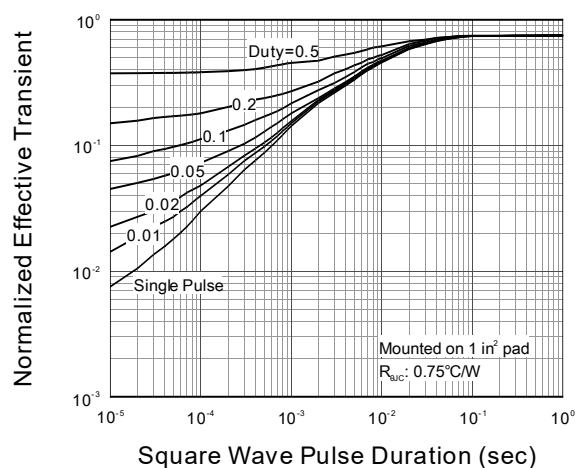


Figure 4. Transient Thermal Impedance

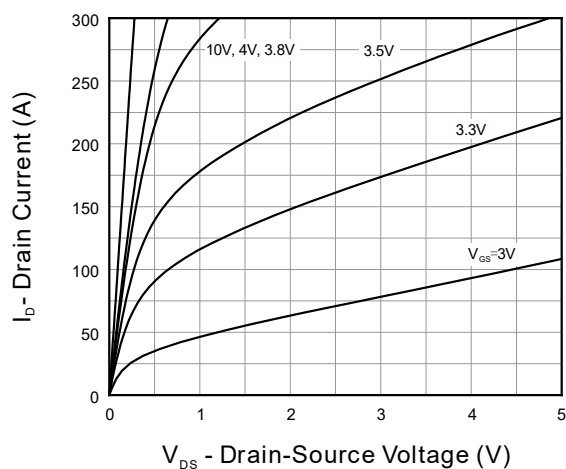


Figure 5. Output Characteristics

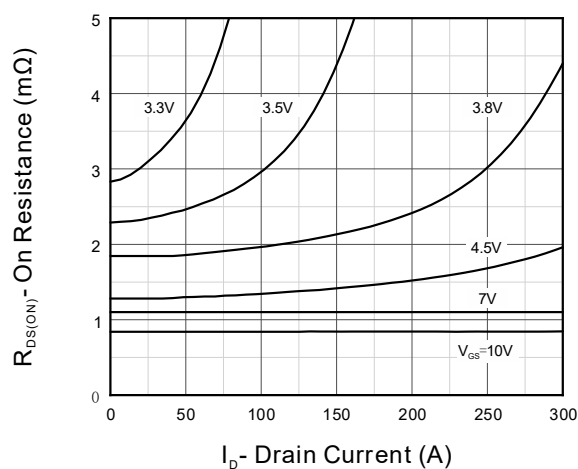


Figure 6. On Resistance

7. Typical Characteristics (cont.)

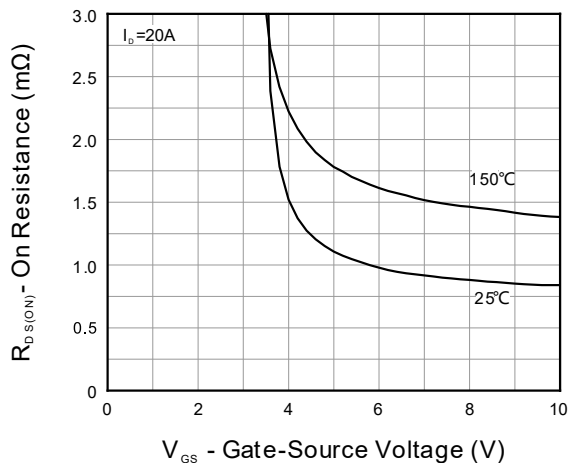


Figure 7. Transfer Characteristics

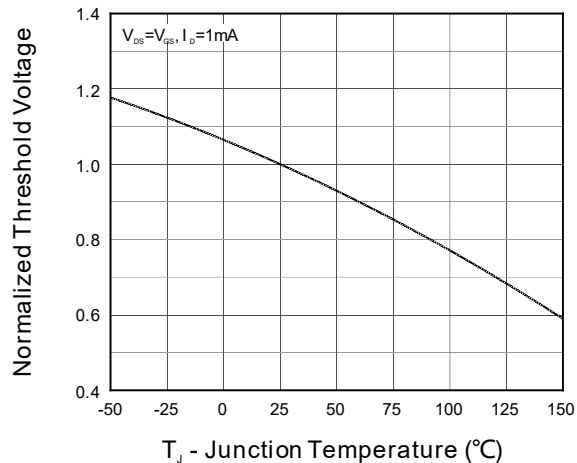


Figure 8. Normalized $V_{GS(th)}$

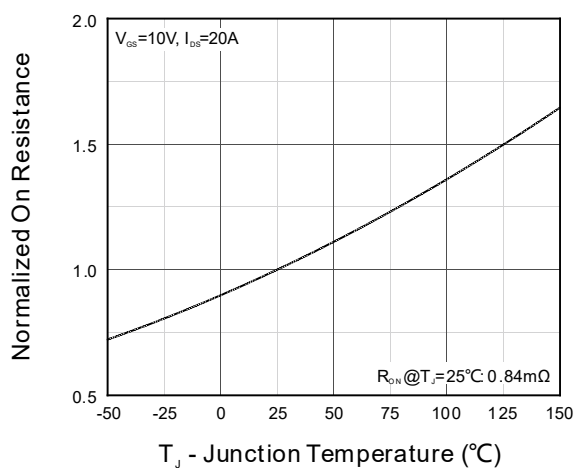


Figure 9. Normalized On Resistance

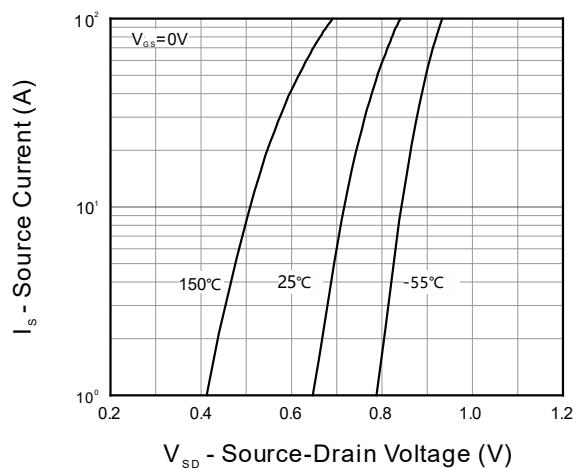


Figure 10. Diode Forward Current

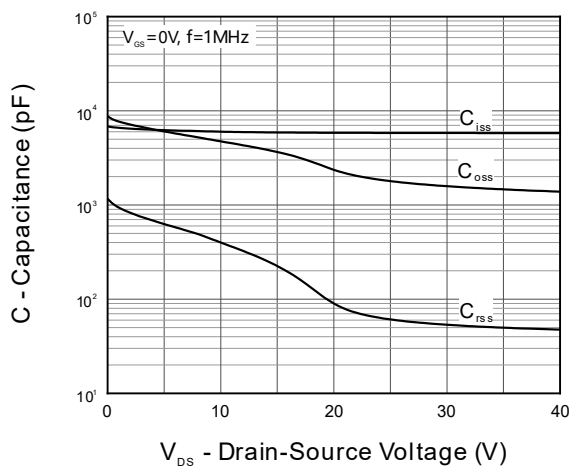


Figure 11. Capacitance

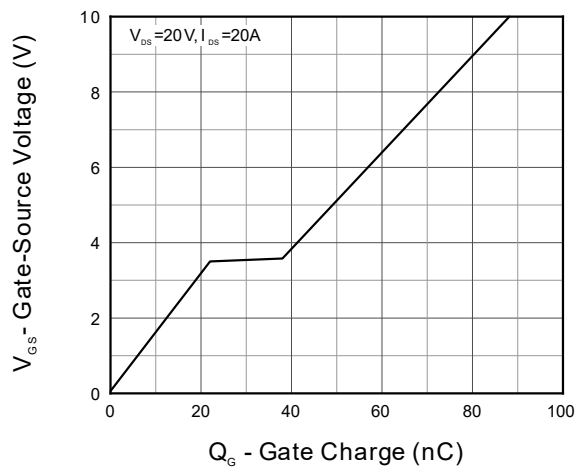
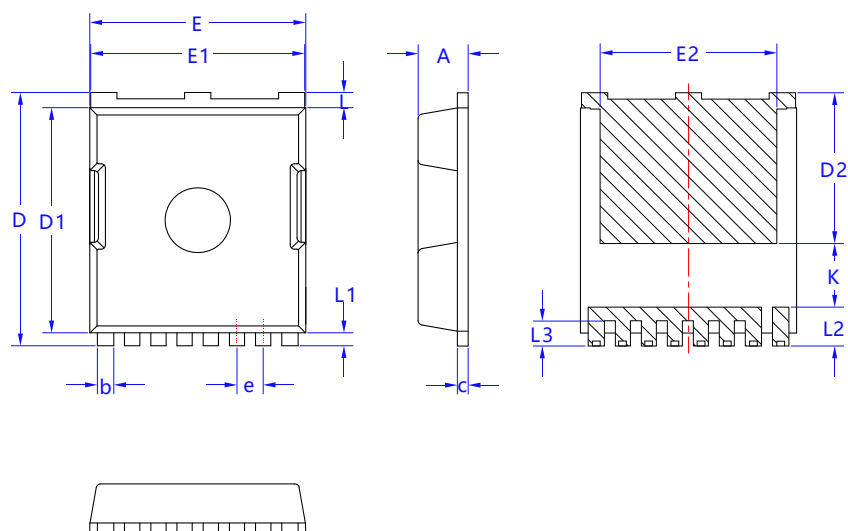


Figure 12. Gate Charge

8. Package Dimensions

TOLL-8L Package



Symbol	Dimensions in Millimeters		
	MIN	NOM	MAX
A	2.20	2.30	2.40
b	0.60	0.70	0.90
c	0.40	0.50	0.60
D	11.48	11.68	11.88
D1	10.28	10.38	10.55
D2	6.85	6.95	7.05
E	9.80	9.90	10.0
E1	9.70	9.80	9.90
E2	8.00	8.10	8.20
e	1.20 BSC		
L	0.60 TYPE		
L1	0.60 TYPE		
L2	1.60	1.80	2.10
L3	1.00	1.15	1.30
K	2.90 TYPE		