

N-Channel Enhancement Mode MOSFET

1. Product Information

1.1 Features

- ☒ Surface-mounted package
- ☒ Low $R_{DS(ON)}$
- ☒ T_J max 175°C
- ☒ Low thermal impedance
- ☒ 100% avalanche tested
- ☒ MSL 1

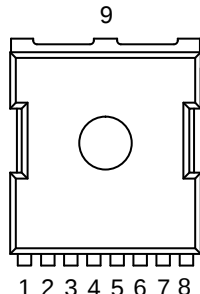
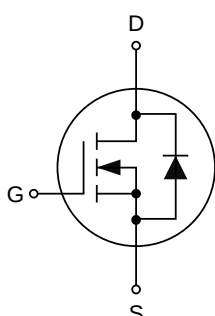
1.2 Applications

- ☒ BMS appliances
- ☒ Power switch
- ☒ DC/DC conversion
- ☒ Light electric vehicles

1.3 Quick reference

- ☒ $BV \geq 40\text{ V}$
- ☒ $P_D \leq 375\text{ W}$
- ☒ $I_D \leq 300\text{ A}$
- ☒ $R_{DS(ON)} \leq 0.95\text{ m}\Omega @V_{GS} = 10\text{ V}$

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^*	Drain Current (DC)	$T_C=25^{\circ}\text{C}, V_{GS}=10\text{ V}$	-	300	A
		$T_C=100^{\circ}\text{C}, V_{GS}=10\text{ V}$	-	240	A
		$T_A=25^{\circ}\text{C}$	-	47	A
$I_{DM}^{*,**}$	Drain Current (Pulsed)	$T_C=25^{\circ}\text{C}, V_{GS}=10\text{ V}$	-	960	A
P_D	Drain Power Dissipation	$T_C=25^{\circ}\text{C}$	-	375	W
I_S	Continuous-Source Current	$T_C=25^{\circ}\text{C}$	-	300	A
E_{AS}	Single Pulsed Avalanche Energy	$V_{DD}=20\text{ V}, L=1.0\text{ mH}$	-	1600	mJ
T_J, T_{stg}	Operating Junction and Storage Temperature		-55	175	$^{\circ}\text{C}$
$R_{\theta JA}^*$	Thermal Resistance-Junction to Ambient		-	40	$^{\circ}\text{C/W}$
$R_{\theta JC}$	Thermal Resistance-Junction to Case		-	0.4	$^{\circ}\text{C/W}$

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
KJ009N04TH	KJ009N04TH AYWWXX XXXXXX

5. Ordering Code

Product Name	Package	Reel Size	Tape width	Quantity
KJ009N04TH	TOLL-8L	13"	24 mm	2000

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_C=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	2.5	3.5	4.5	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} =90 A	-	0.75	0.95	mΩ
R _g	Gate resistance	f=1 MHz, open drain	-	2	-	Ω
Diode Characteristics						
V _{SD} ^a	Diode Forward Voltage	V _{GS} =0 V, I _{SD} =90 A	-	-	1.1	V
t _{rr}	Reverse Recovery Time	V _{DS} =20 V, I _{SD} =180 A, dI _{SD} /dt=100 A/μs	-	73	-	ns
Q _{rr}	Reverse Recovery Charge		-	173	-	nC
Dynamic Characteristics ^b						
C _{iSS}	Input Capacitance	V _{GS} =0 V, V _{DS} =25 V, f=1 MHz	-	6988	-	pF
C _{oSS}	Output Capacitance		-	2162	-	
C _{rSS}	Reverse Transfer Capacitance		-	220	-	
t _{d(on)}	Turn-on Delay Time	V _{DS} =20 V, V _{GEN} =10 V, R _G =6 Ω, I _{DS} =90 A	-	50	-	ns
t _r	Turn-on Rise Time		-	75	-	
t _{d(off)}	Turn-off Delay Time		-	132	-	
t _f	Turn-off Fall Time		-	48	-	
Gate Charge Characteristics ^b						
Q _g	Total Gate Charge	V _{DS} =20 V, V _{GS} =10 V, I _{DS} =180 A	-	119	-	nC
Q _{gs}	Gate-Source Charge		-	38	-	
Q _{gd}	Gate-Drain Charge		-	42	-	

Notes:

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

7. Typical Characteristics

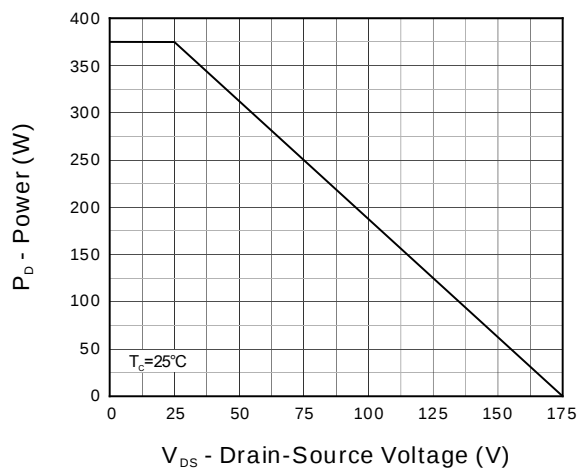


Figure 1. Output Characteristics

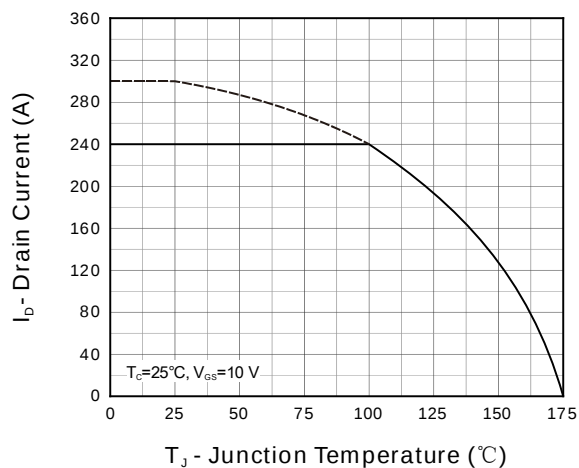


Figure 2. Current Capability

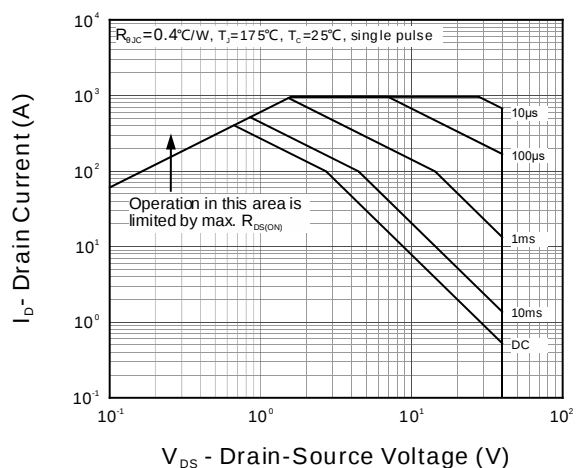


Figure 3. Safe Operation Area

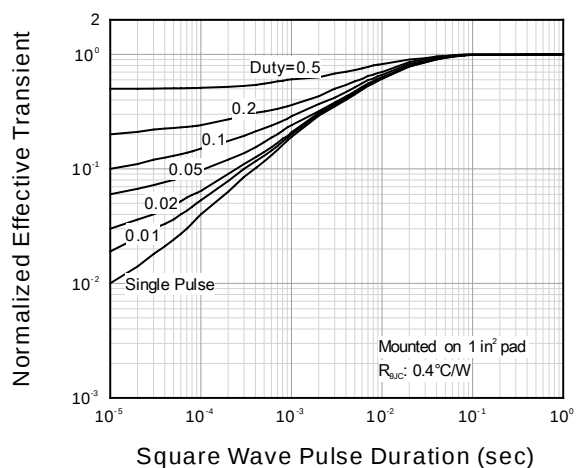


Figure 4. Transient Thermal Impedance

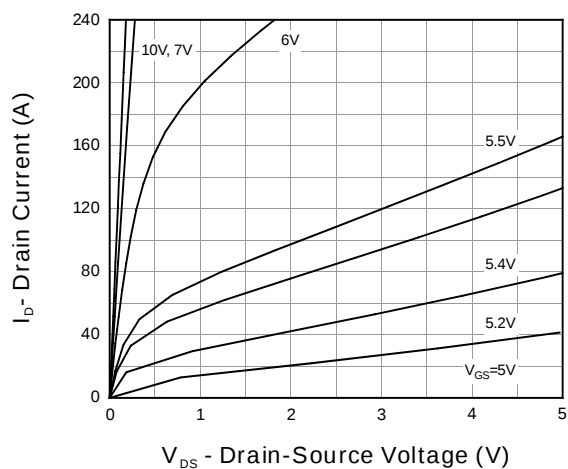


Figure 5. Output Characteristics

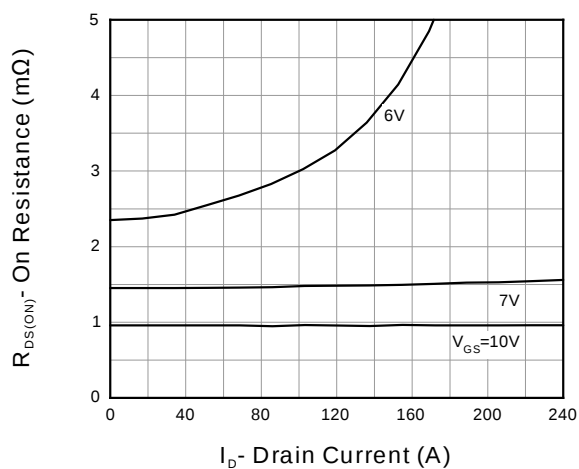


Figure 6. On Resistance

7. Typical Characteristics (cont.)

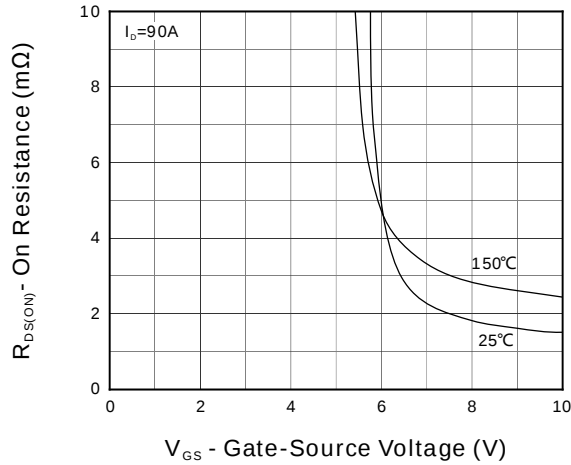


Fig 7. Transfer Characteristics

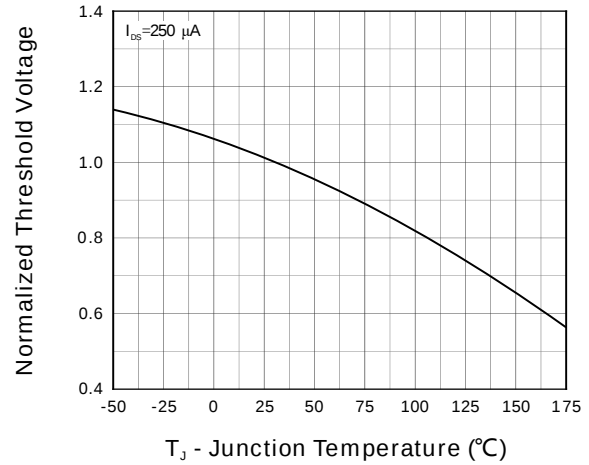


Fig 8. Normalized Threshold Voltage

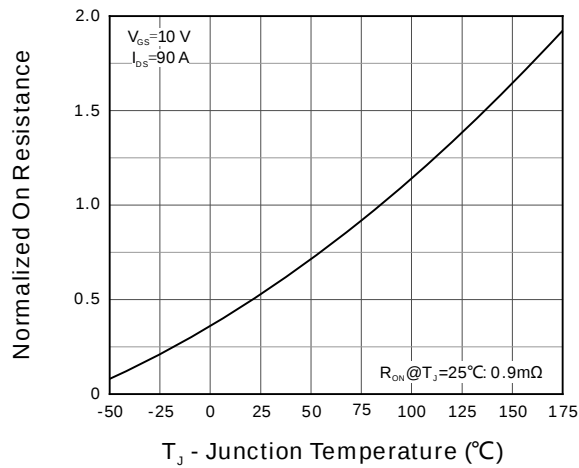


Fig 9. Normalized On Resistance

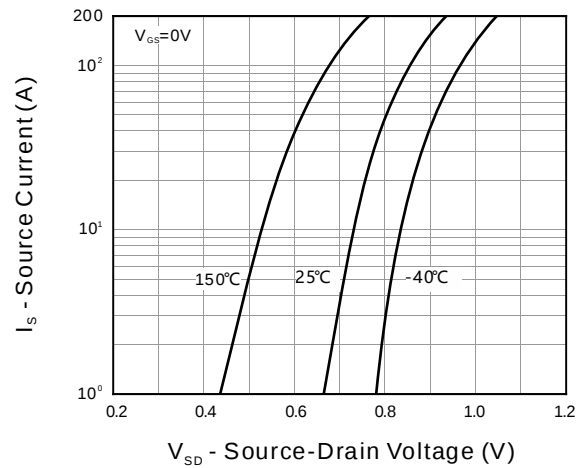


Fig 10. Diode Forward Current

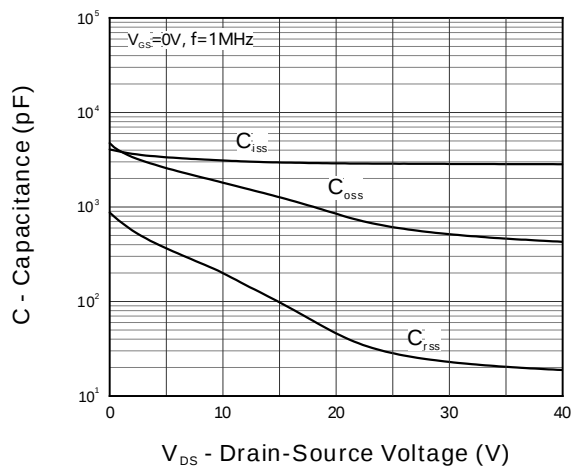


Fig 11. Capacitance

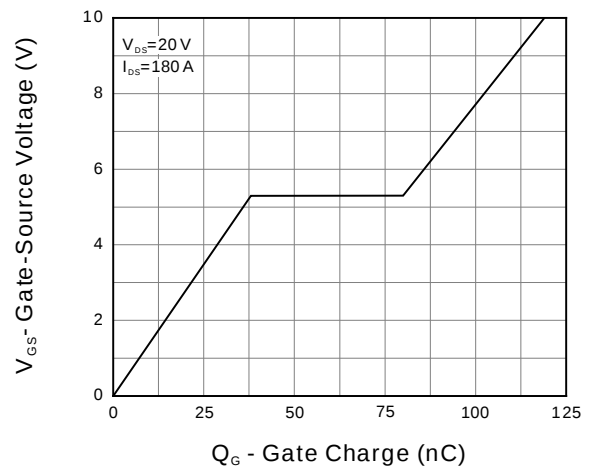
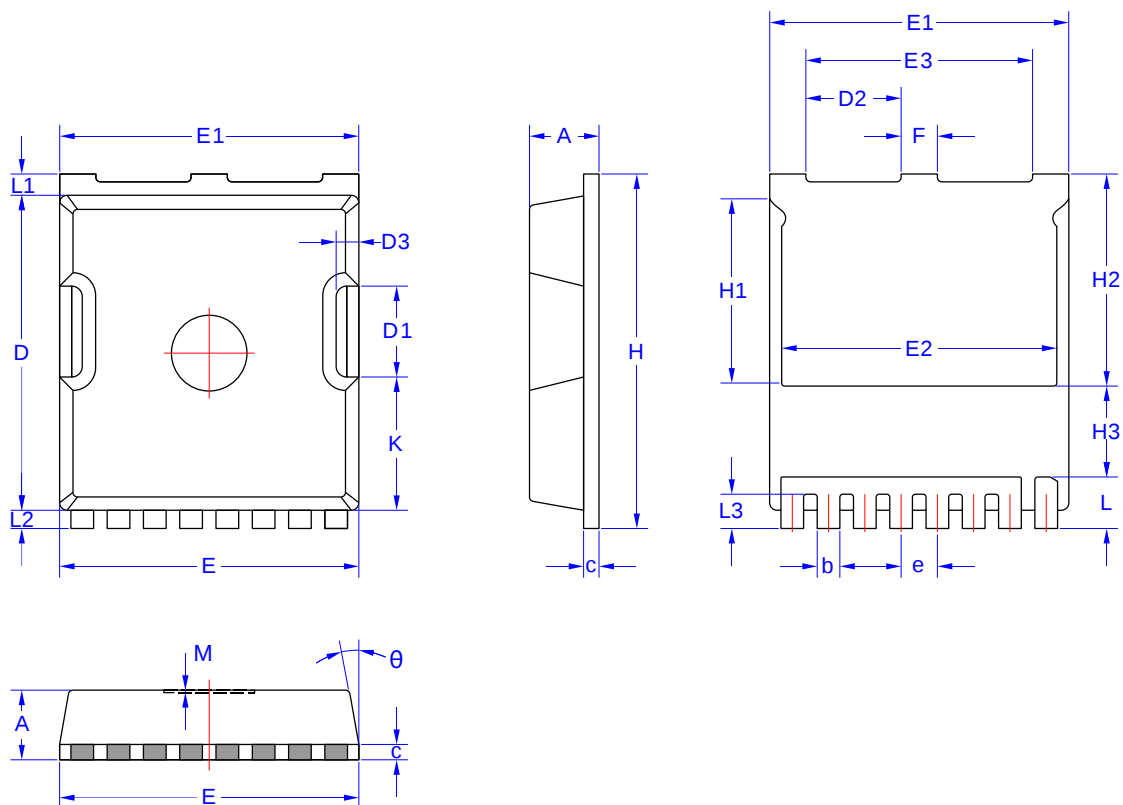


Fig 12. Gate Charge

8. Package Dimensions

ToLL-8L Package



Symbol	Dimensions in Millimeters		
	MIN	NOM	MAX
A	2.20	2.30	2.40
b	0.65	0.75	0.85
c		0.508 REF	
D	10.25	10.40	10.55
D1	2.85	3.00	3.15
D2	2.95	3.10	3.25
D3		0.75 REF	
E	9.75	9.90	10.05
E1	9.65	9.80	9.95
E2	8.95	9.10	9.25
E3	7.25	7.40	7.55
e		1.20 BSC	

Symbol	Dimensions in Millimeters		
	MIN	NOM	MAX
F	1.05	1.20	1.35
H	11.55	11.70	11.85
H1	6.03	6.18	6.33
H2	6.85	7.00	7.15
H3		3.00 BSC	
K	4.25	4.40	4.55
L	1.55	1.70	1.85
L1	0.55	0.70	0.85
L2	0.45	0.60	0.75
L3	1.00	1.15	1.30
M		0.08 REF	
θ	8°	10°	12°