

## P-Channel Enhancement Mode MOSFET

### 1. Product Information

#### 1.1 Features

- Advanced trench cell design
- Low Thermal Resistance

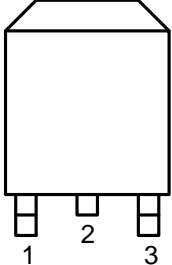
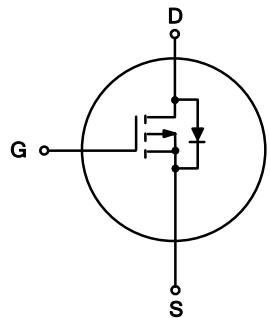
#### 1.2 Applications

- Motor drivers
- DC - DC Converter

#### 1.3 Quick reference

- $BV \geq -20\text{ V}$
- $R_{DS(ON)} \leq 8\text{ m}\Omega @ V_{GS} = -10\text{ V}$
- $P_{tot} \cong 20\text{ W}$
- $R_{DS(ON)} \leq 9\text{ m}\Omega @ V_{GS} = -4.5\text{ V}$
- $I_D \cong -50\text{ A}$
- $R_{DS(ON)} \leq 12\text{ m}\Omega @ V_{GS} = -2.5\text{ V}$

### 2. Pin Description

Pin	Description	Simplified Outline	Symbol
1	Gate(G)	 <p>Top View TO-252</p>	
2	Drain(D)		
3	Source(S)		

### 3. Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DS}$	Drain-Source Voltage	$T_C = 25\text{ }^\circ\text{C}$	-	-20	V
$V_{GS}$	Gate-Source Voltage	$T_C = 25\text{ }^\circ\text{C}$	-	$\pm 12$	V
$I_D^*$	Drain Current	$T_C = 25\text{ }^\circ\text{C}, V_{GS} = -4.5\text{ V}$	-	-50	A
$I_{DM}^{****}$	Pulsed Source Current	$T_C = 25\text{ }^\circ\text{C}, V_{GS} = -4.5\text{ V}$	-	-96	A
$P_{tot}^*$	Total Power Dissipation	$T_C = 25\text{ }^\circ\text{C}$	-	20	W
$T_{stg}$	Storage Temperature		- 55	150	$^\circ\text{C}$
$T_J$	Junction Temperature		-	150	$^\circ\text{C}$
$I_S$	Diode Forward Current	$T_C = 25\text{ }^\circ\text{C}$	-	-50	A
$R_{\theta JC}^*$	Thermal Resistance- Junction to Ambient		-	6	$^\circ\text{C} / \text{W}$

Notes :

- \* Surface Mounted on 1 in<sup>2</sup> pad area,  $t \leq 10\text{ sec}$
- \*\* Pulse width  $\leq 10\text{ }\mu\text{s}$ , duty cycle  $\leq 1\%$
- \*\*\* Limited by bonding wire

### 4. Marking Information

Product Name	Marking
KJ50P02K	<div style="display: inline-block; border: 1px solid black; padding: 2px;"> <b>50P02</b>  <b>YWWXXX</b> </div> YWW: Date Code

### 5. Ordering Code

Product Name	Package	Reel Size	Tape width	Quantity	Note
KJ50P02K	TO252			2500	

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** ( $T_C = 25\text{ }^\circ\text{C}$  Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-20	-	-	V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{DS} = -250\text{ }\mu\text{A}$	-0.3	-	-1.2	V
$I_{DSS}$	Zero Gate Voltage Source Current	$V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}$	-	-	-10	$\mu\text{A}$
		$T_J = 85\text{ }^\circ\text{C}$	-	-	-30	$\mu\text{A}$
$I_{GSS}$	Gate Leakage Current	$V_{GS} = \pm 12\text{ V}, V_{DS} = 0\text{ V}$	-	-	$\pm 100$	nA
$R_{DS(ON)}^a$	Drain-Source On-State Resistance	$V_{GS} = -10\text{ V}, I_D = -13\text{ A}$	-	-	8	m $\Omega$
		$V_{GS} = -4.5\text{ V}, I_D = -10\text{ A}$	-	-	9	m $\Omega$
		$V_{GS} = -2.5\text{ V}, I_D = -6\text{ A}$	-	-	12	m $\Omega$
<b>Diode Characteristics</b>						
$V_{SD}^a$	Diode Forward Voltage	$I_{SD} = -2.6\text{ A}, V_{GS} = 0\text{ V}$	-	-	-1.2	V
$t_{rr}$	Reverse Recovery Time	$I_{SD} = -10\text{ A}, dI_{SD}/dt = 100\text{ A}/\mu\text{s}$	-	36	-	nS
$Q_{rr}$	Reverse Recovery Charge		-	20	-	nC
<b>Dynamic Characteristics<sup>b</sup></b>						
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{ V}, V_{DS} = -10\text{ V}$ Frequency = 1 MHz	-	6200	-	pF
$C_{oss}$	Output Capacitance		-	700	-	
$C_{rss}$	Reverse Transfer Capacitance		-	380	-	
$t_d(on)$	Turn-on Delay Time	$V_{DS} = -10\text{ V}, V_{GEN} = -5\text{ V},$ $R_G = 3.3\text{ }\Omega,$ $I_D = -1\text{ A}$	-	27	-	nS
$t_r$	Turn-on Rise Time		-	21	-	
$t_d(off)$	Turn-off Delay Time		-	240	-	
$t_f$	Turn-off Fall Time		-	110	-	
<b>Gate Charge Characteristics<sup>b</sup></b>						
$Q_g$	Total Gate Charge	$V_{GS} = -4.5\text{ V}, V_{DS} = -10\text{ V},$ $I_{DS} = -10\text{ A}$	-	60	-	nC
$Q_{gs}$	Gate-Source Charge		-	10	-	
$Q_{gd}$	Gate-Drain Charge		-	13.5	-	

Notes :

- a : Pulse test ; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$
- b : Guaranteed by design, not subject to production testing

## 7. Typical Characteristics

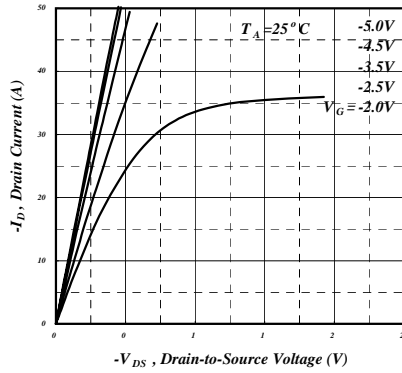


Fig 1. Typical Output Characteristics

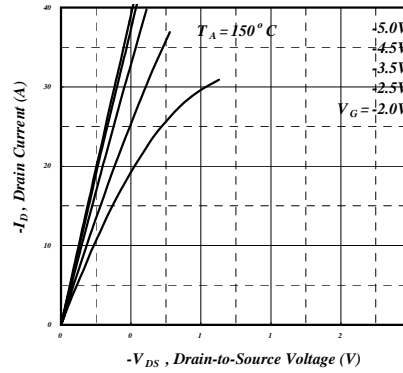


Fig 2. Typical Output Characteristics

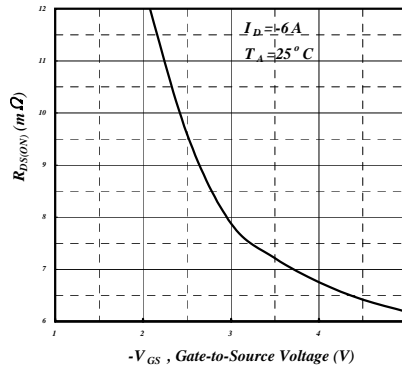


Fig 3. On-Resistance v.s. Gate Voltage

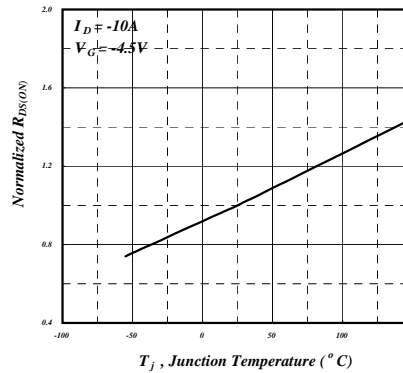


Fig 4. Normalized On-Resistance v.s. Junction Temperature

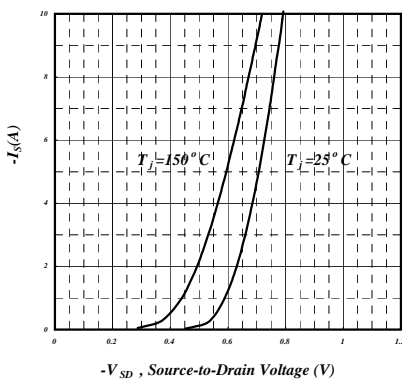


Fig 5. Forward Characteristic of Reverse Diode

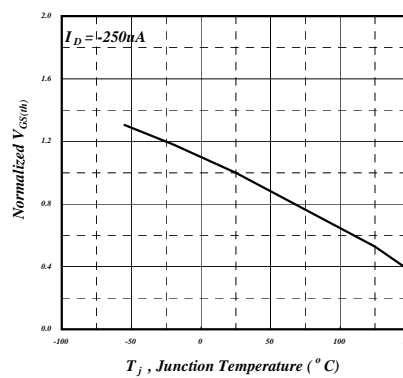


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

## 7. Typical Characteristics (cont.)

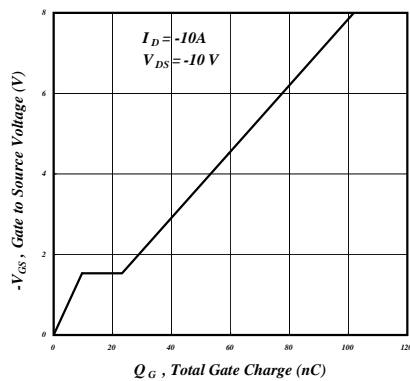


Fig 7. Gate Charge Characteristics

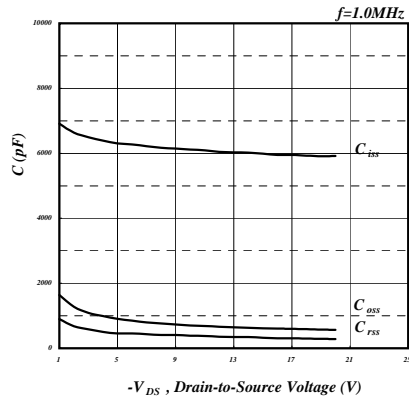


Fig 8. Typical Capacitance Characteristics

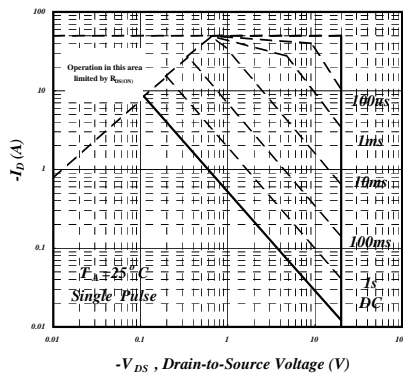


Fig 9. Maximum Safe Operating Area

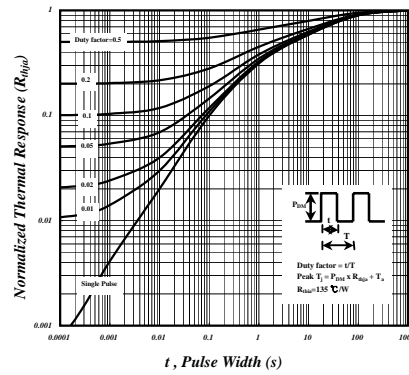


Fig 10. Effective Transient Thermal Impedance

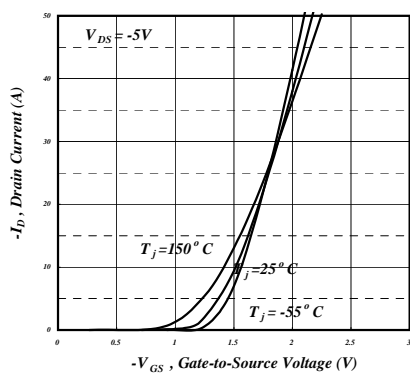


Fig 11. Transfer Characteristics

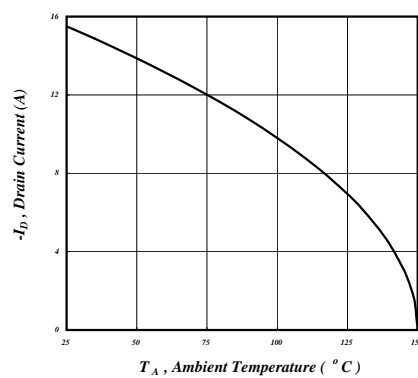
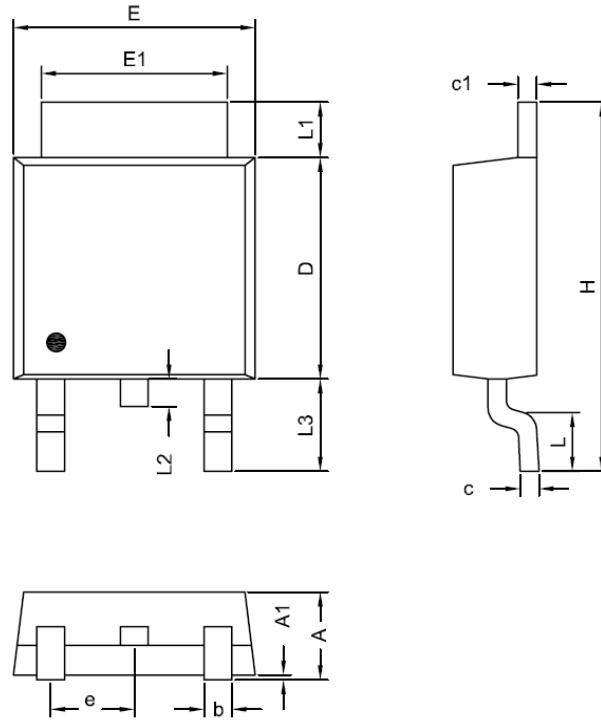


Fig 12. Drain Current v.s. Ambient Temperature

## 8. Package Dimensions

### TO252-3L



Symbol	Dimensions In Millimeters	
	MIN.	MAX.
A	2.19	2.38
A1	0.02	0.13
D	5.30	6.40
E	6.35	6.80
E1	5.20	5.50
c	0.40	0.60
c1	0.40	0.60
b	0.55	0.85
e	2.30 BCS	
L	1.00	1.80
L1	0.70	1.80
L2	0.70 BCS	
L3	2.40	2.80
H	9.20	10.40