

## N-Channel Enhancement Mode MOSFET

### 1. Product Information

#### Features

- Advanced Trench Technology
- Low  $R_{DS(ON)}$
- Low gate charge
- Fast switching

#### Applications

- Power switching application
- Load switch
- Uninterruptible power supply

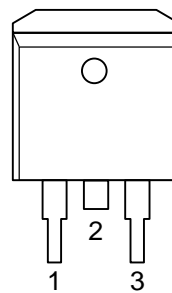
#### Quick reference

- $V_{DS} \geq 60\text{ V}$
- $I_D \leq 90\text{ A}$
- $R_{DS(ON)} \leq 7.0\text{ m}\Omega$  @  $V_{GS} = 10\text{ V}$  (Type: 6.2 m $\Omega$ )

#### Pin Description

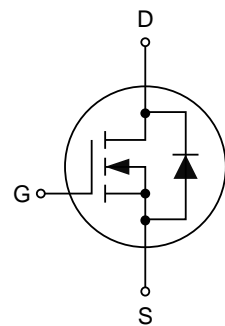
Pin	Description
1	Gate(G)
2	Drain(D)
3	Source(S)

#### Simplified Outline



Top View  
TO-263

#### Symbol



### Package Marking and Ordering Information

Product Name	Package	Marking	Reel size	Tape width	Quantity(pcs)
KJ90N06D	TO-263	KJ90N06D	13"	24 mm	800

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

Symbol	Parameter	Values	Unit
$V_{DS}$	Drain-Source Voltage	60	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current, $V_{GS}@10\text{ V}$ , $T_C=25^\circ\text{C}$ <sup>1</sup>	90	A
	Continuous Drain Current, $V_{GS}@10\text{ V}$ , $T_C=100^\circ\text{C}$ <sup>1</sup>	63	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	320	A
$E_{AS}$	Single Pulse Avalanche Energy <sup>3</sup>	147	mJ
$P_D$	Power Dissipation, $T_C=25^\circ\text{C}$ <sup>4,5</sup>	160	W
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	-55–150	$^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction-Ambient (Steady State) <sup>1</sup>	62	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance, Junction-Case	0.78	$^\circ\text{C}/\text{W}$

## 3. Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0 V, I <sub>DS</sub> =250 μA	60	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Source Current	V <sub>DS</sub> =60 V, V <sub>GS</sub> =0 V	-	-	1	μA
		T <sub>J</sub> =85°C	-	-	30	μA
I <sub>GSS</sub>	Gate Leakage Current	V <sub>DS</sub> =0 V, V <sub>GS</sub> =±20 V	-	-	±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250 μA	1.2	-	2.5	V
R <sub>DS(ON)</sub> <sup>2</sup>	Drain-Source On-State Resistance	V <sub>GS</sub> =10 V, I <sub>DS</sub> =45 A	-	6.2	7.0	mΩ
		V <sub>GS</sub> =4.5 V, I <sub>DS</sub> =45 A	-	7.6	9	mΩ
<b>Diode Characteristics</b>						
V <sub>SD</sub> <sup>2</sup>	Diode Forward Voltage	I <sub>SD</sub> =90 A, V <sub>GS</sub> =0 V	-	0.8	1.1	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>SD</sub> =90 A, dI <sub>SD</sub> /dt=100 A/μs	-	35	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge		-	55	-	nC
<b>Dynamic Characteristics<sup>6</sup></b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0 V, V <sub>DS</sub> =25 V, f=1 MHz	-	3450	-	pF
C <sub>oss</sub>	Output Capacitance		-	320	-	
C <sub>rss</sub>	Reverse Transfer Capacitance		-	221	-	
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DS</sub> =30 V, V <sub>GEN</sub> =10 V, I <sub>DS</sub> =30 A	-	16	-	ns
t <sub>r</sub>	Turn-on Rise Time		-	11	-	
t <sub>d(off)</sub>	Turn-off Delay Time		-	55	-	
t <sub>f</sub>	Turn-off Fall Time		-	14	-	
<b>Gate Charge Characteristics<sup>6</sup></b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> =4.5 V, V <sub>DS</sub> =15 V, I <sub>DS</sub> =15 A	-	97	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	18	-	
Q <sub>gd</sub>	Gate-Drain Charge		-	26	-	

Notes:

1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2 OZ copper.
2. The test condition is Pulse Test: Pulse width ≤ 300 μs, Duty Cycle ≤ 2%.
2. The E<sub>AS</sub> data shows Max. rating. I<sub>AS</sub>=21 A, V<sub>DD</sub>=15 V, V<sub>GS</sub>=10 V, L=0.5 mH.
4. The power dissipation is limited by 150°C junction temperature.
5. The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.
6. Guaranteed by design, not subject to production testing.

## 4. Electrical Characteristics

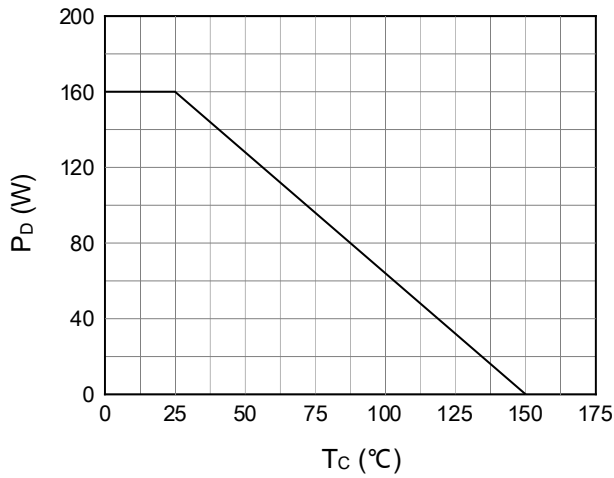


Figure 1. Power Capability

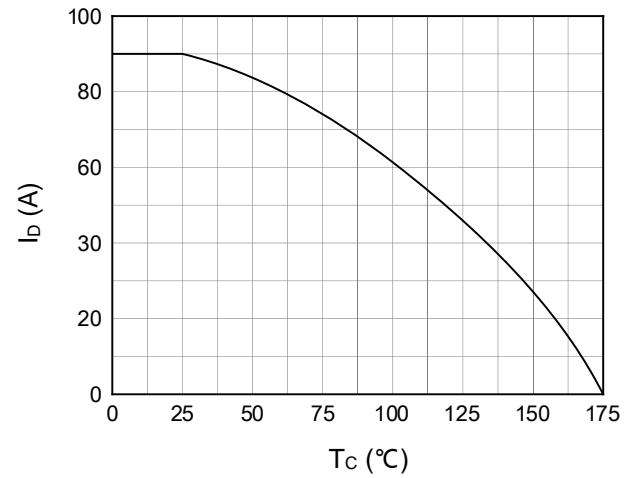


Figure 2. Current Capability

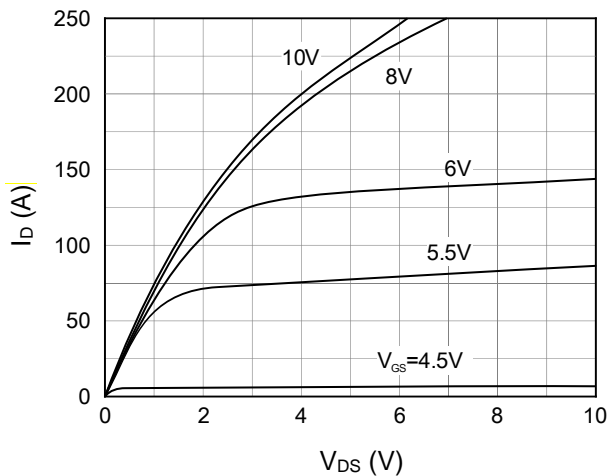


Figure 3. Output characteristics

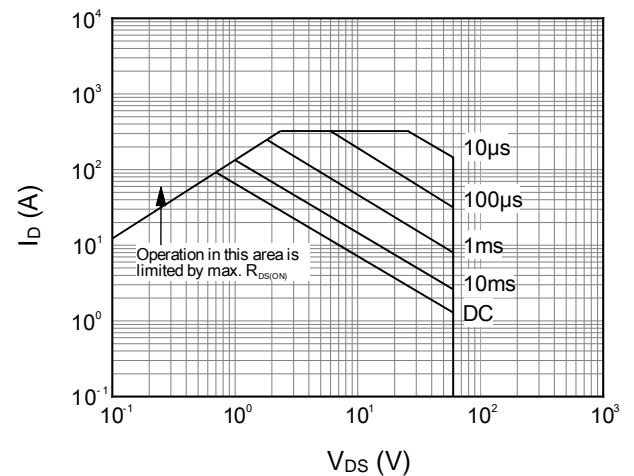


Figure 4. Safe operating area

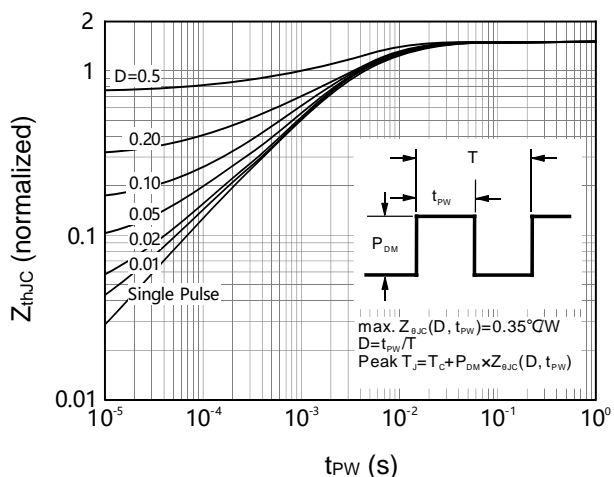


Figure 5. Normalized transient thermal impedance from junction to case

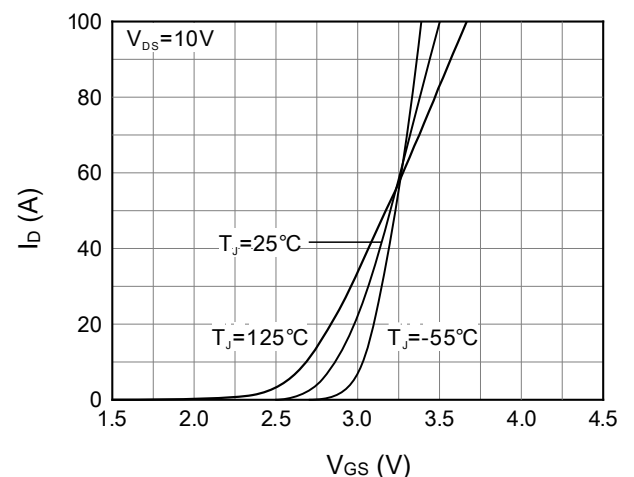


Figure 6. Transfer characteristics

## 4. Electrical Characteristics (cont.)

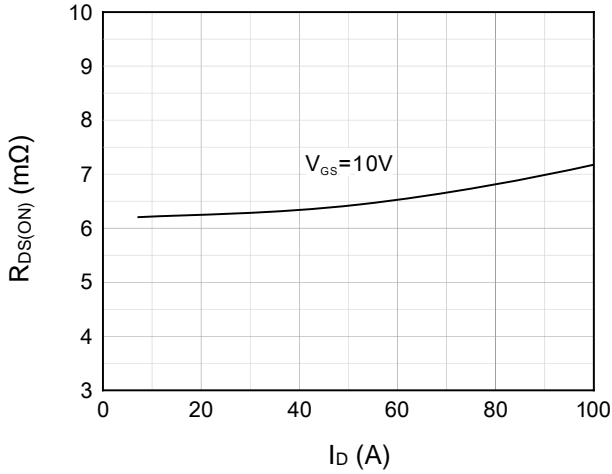


Figure 7. On-resistance vs drain current

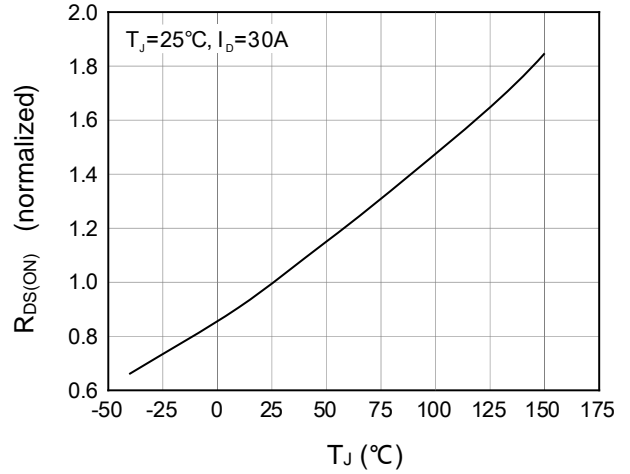


Figure 8. Normalized on-resistance vs junction temperature

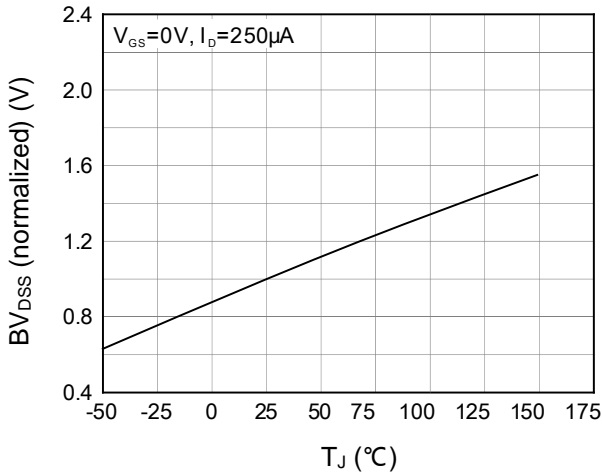


Figure 9.  $BV_{DS}$  vs junction temperature

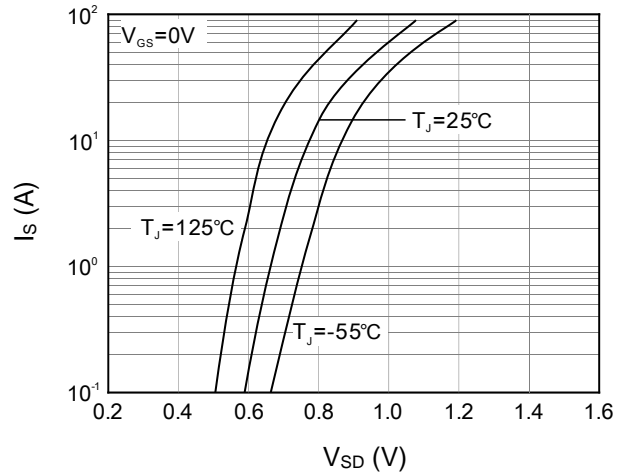


Figure 10. Forward characteristics of body diode

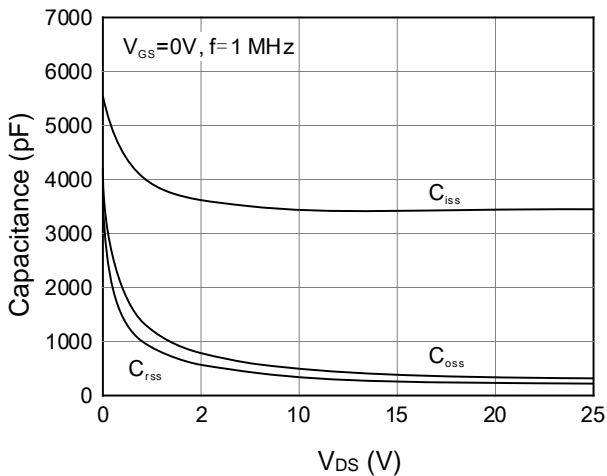


Figure 11. Capacitance

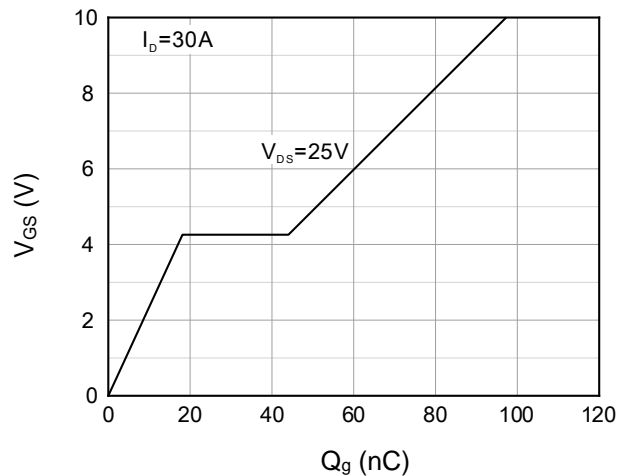
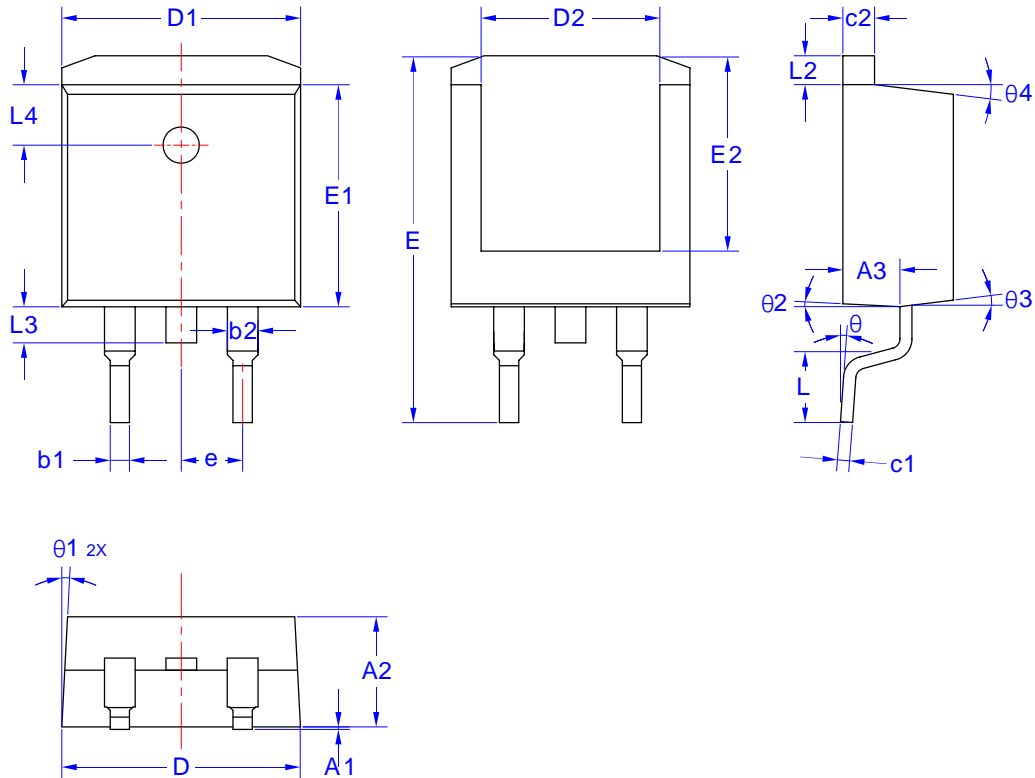


Figure 12. Gate charge

## 5. Package Mechanical Data

### 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
$\theta$		0-8°	
$\theta_1$		3°	
$\theta_2$		3°	
$\theta_3$		7°	
$\theta_4$		7°	