

## 1. Description

The KNX3302A uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching applications.

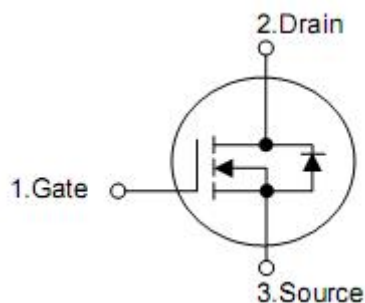
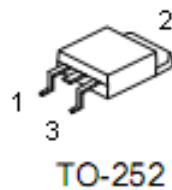
## 2. Features

- n  $R_{DS(on)}=3.8m\Omega(\text{typ.}) @ V_{GS}=4.5V$
- n  $V_{DS}=20V \quad I_D=85A$

## 3. Applications

- n Battery protection
- n Load switch
- n Uninterruptible power supply

## 4. Symbol



Pin	Function
1	Gate
2	Drain
3	Source

## 5. Ordering Information

Part Number	Package	Brand
KND3302A	TO-252	KIA

## 6. Absolute maximum ratings

Parameter	Symbol	Rating	Units
Drain-source voltage	$V_{DS}$	20	V
Gate-source voltage	$V_{GS}$	$\pm 12$	V
Continuous drain current, $V_{GS}$ @10V	$I_D$	$T_C=25^\circ\text{C}$	85
		$T_C=100^\circ\text{C}$	59
Pulsed drain current	$I_{DM}$	340	A
Single pulse avalanche energy <sup>(Note5)</sup>	$E_{AS}$	338	mJ
Maximum power dissipation	$P_D$	87	W
Operation junction and temperature range	$T_J, T_{STG}$	-55 to150	$^\circ\text{C}$

## 7. Thermal characteristics

Parameter	Symbol	Typ	Max	Unit
Thermal resistance,Junction-case	$R_{\theta JC}$	--	1.43	$^\circ\text{C/W}$

## 8. Electrical characteristics

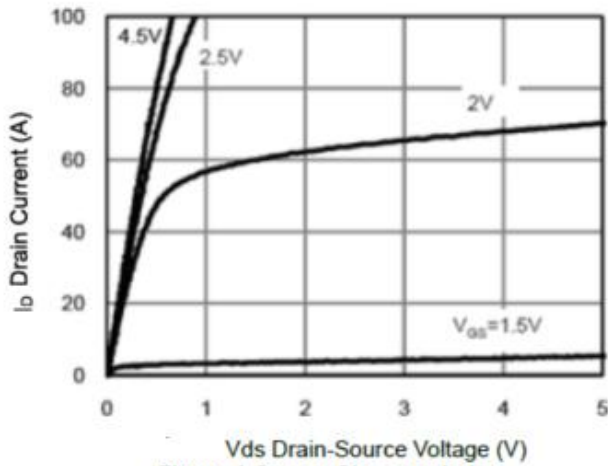
(T<sub>A</sub>=25°C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Drain-source breakdown voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	20	-	-	V
Drain-source on-State resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =4.5V, I <sub>D</sub> =25A	-	3.8	5.5	mΩ
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =20A	-	5.0	7.5	
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	0.4	0.65	1.1	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =16V, V <sub>GS</sub> =0V	-	-	1	μA
Gate- Body Leakage current	I <sub>GSS</sub>	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V	-	-	±100	nA
Forward transconductance	g <sub>fs</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =20A	-	20	-	S
Total gate charge	Q <sub>g</sub>	V <sub>DS</sub> =10V, V <sub>GS</sub> =10V I <sub>D</sub> =20A	-	28	-	nC
Gate-source charge	Q <sub>gs</sub>		-	6.5	-	
Gate-drain charge	Q <sub>gd</sub>		-	6.4	-	
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =20A, R <sub>G</sub> =3Ω, V <sub>GS</sub> =4.5V	-	6.5	-	ns
Rise time	t <sub>r</sub>		-	17.2	-	
Turn-off delay time	t <sub>d(off)</sub>		-	29.5	-	
Fall time	t <sub>f</sub>		-	16.7	-	
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, f=1MHz	-	3850	-	pF
Output capacitance	C <sub>oss</sub>		-	500	-	
Reverse transfer capacitance	C <sub>rss</sub>		-	480	-	
Diode Forward Current <sup>(Note2)</sup>	I <sub>S</sub>		-	-	85	A
Diode Forward voltage <sup>(Note3)</sup>	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =10A	-	-	1.3	V
Body diode reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> =20A, T <sub>J</sub> =25 °C di/dt=100A/μs <sup>(Note3)</sup>	-	25	-	ns
Body diode reverse recovery charge	Q <sub>rr</sub>		-	24	-	nC

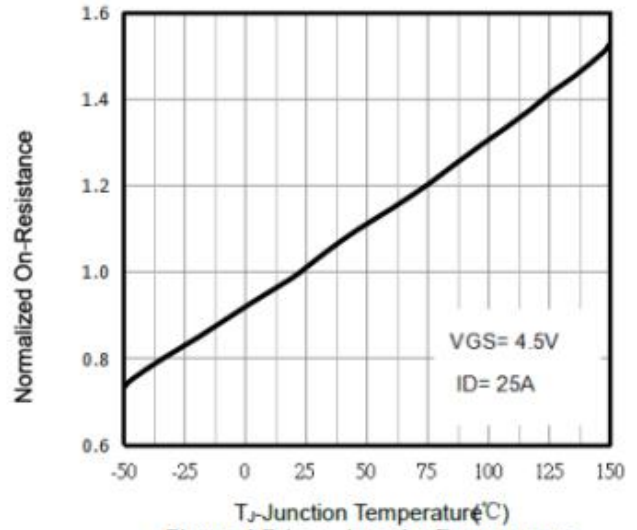
Note:

- 1.Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. E<sub>AS</sub> condition : T<sub>j</sub>=25 °C, V<sub>DD</sub>=20V, V<sub>GS</sub>=4.5V, L=0.5mH, I<sub>d</sub>=26A

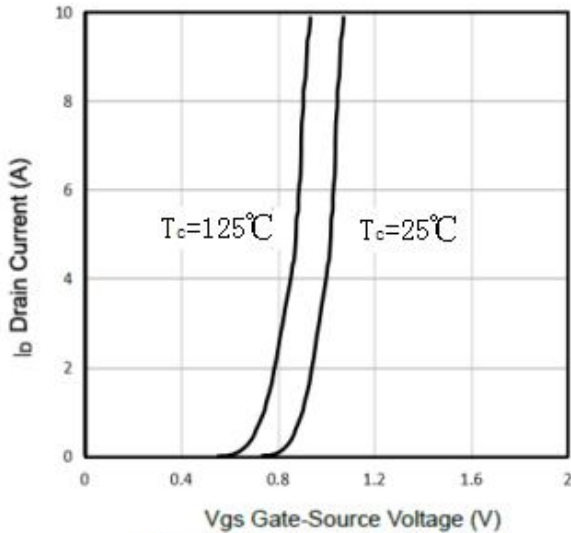
**9. Test circuits**



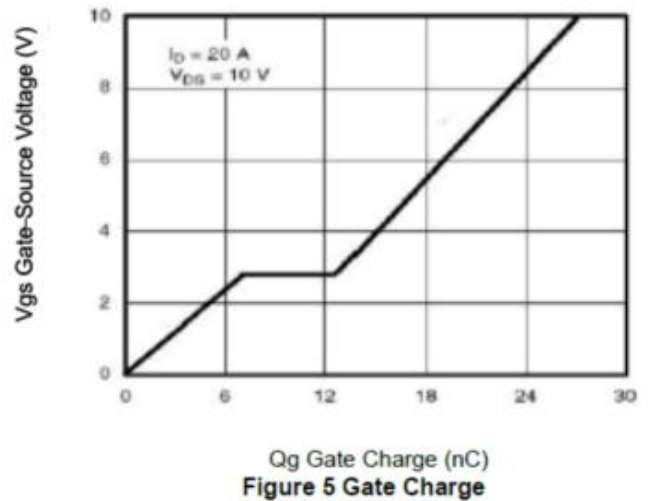
**Figure 1 Output Characteristics**



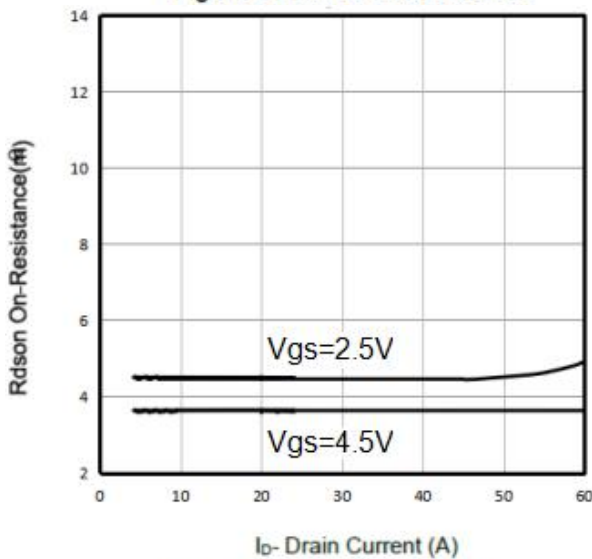
**Figure 4 Rds(on)-Junction Temperature**



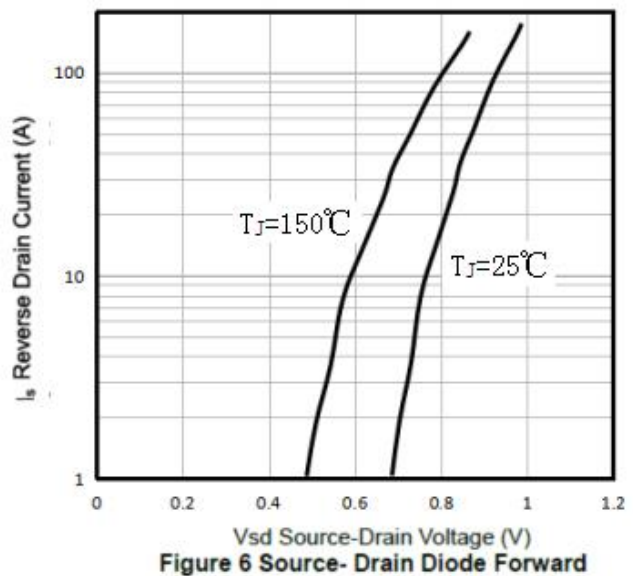
**Figure 2 Transfer Characteristics**



**Figure 5 Gate Charge**



**Figure 3 Rds(on)- Drain Current**



**Figure 6 Source- Drain Diode Forward**

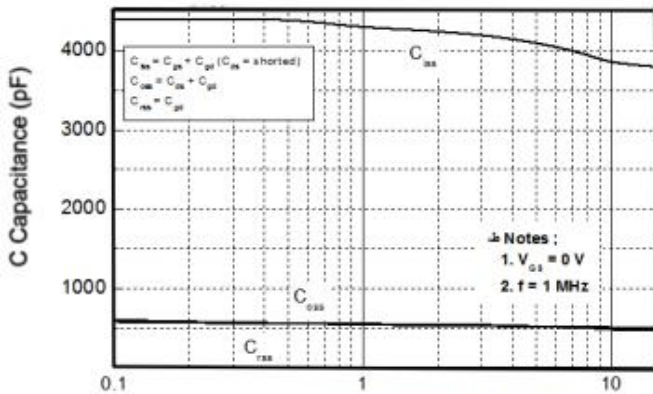


Figure 7 Capacitance vs Vds

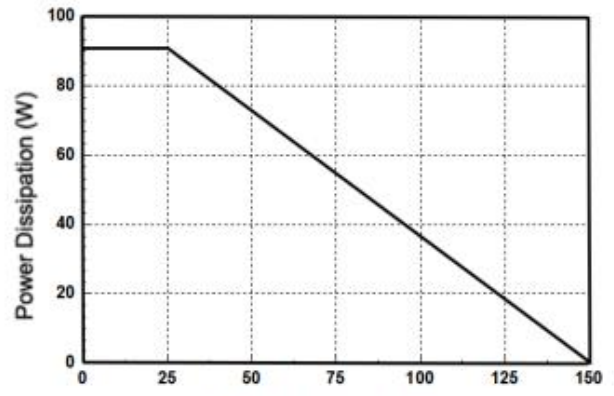


Figure 9 Power De-rating

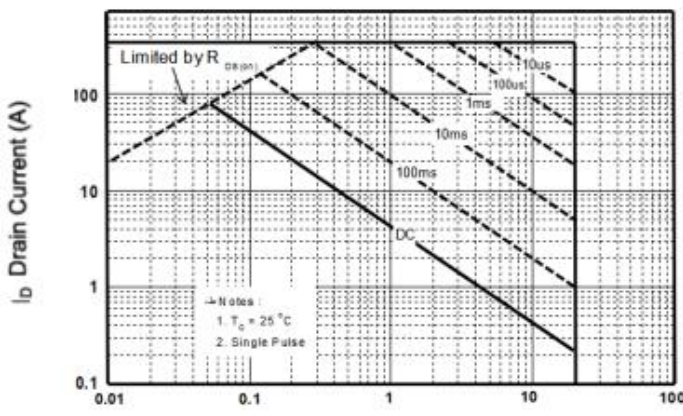


Figure 8 Safe Operation Area

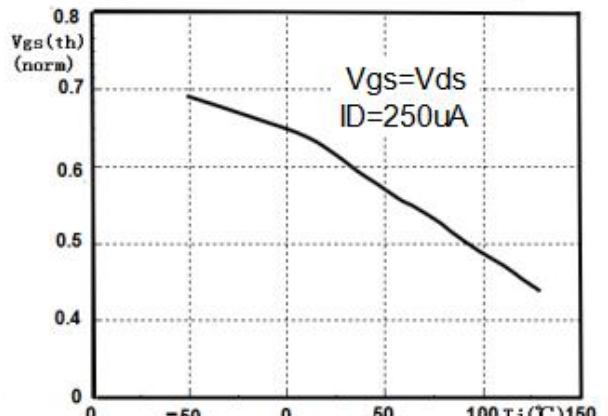
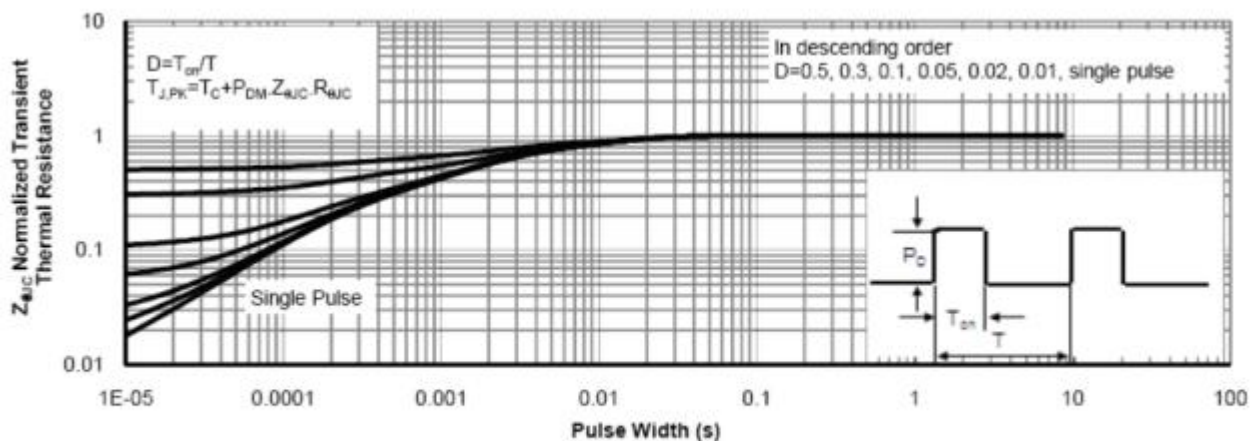


Figure 10  $V_{GS(th)}$  vs Junction Temperature



Square Wave Pluse Duration(sec)

Figure 11 Normalized Maximum Transient Thermal Impedance