

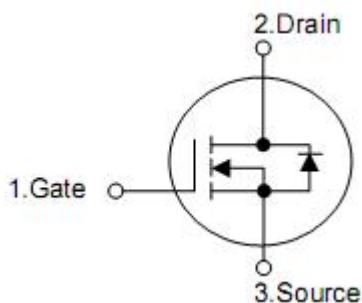
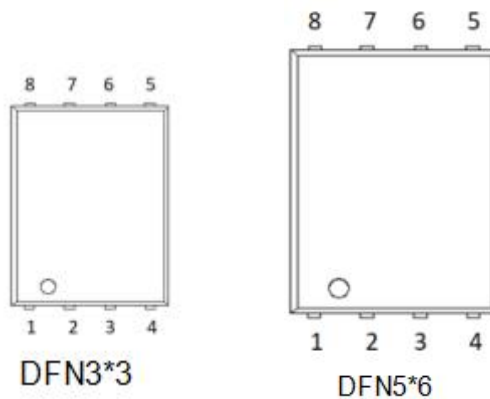
## 1.Features

- n  $R_{DS(on)}(typ.)=7.5m\Omega, V_{GS}=10V$
- n Advanced trench process technology
- n High density cell design for ultra low on-resistance
- n Fully characterized avalanche voltage and current

## 2.Applications

- n High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- n Networking DC-DC Power System
- n Load Switch

## 3. Pin configuration



| Pin     | Function |
|---------|----------|
| 4       | Gate     |
| 5,6,7,8 | Drain    |
| 1,2,3   | Source   |

## 4. Ordering information

| Part Number | Package | Brand |
|-------------|---------|-------|
| KNG3703A    | DFN3*3  | KIA   |
| KNY3703A    | DFN5*6  | KIA   |

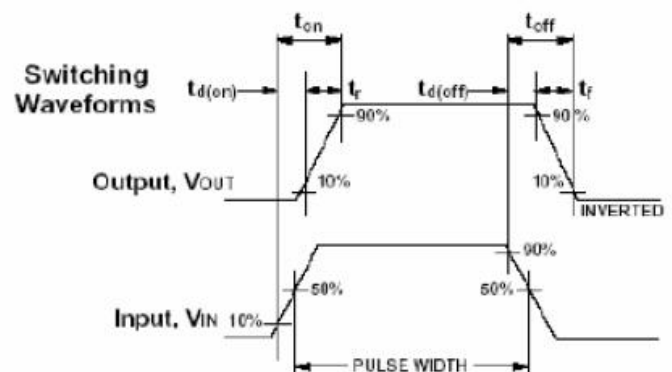
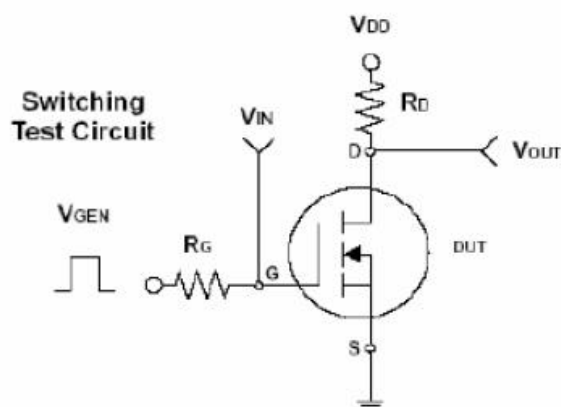
## 5. Maximum ratings and thermal characteristics

( $T_a=25^\circ\text{C}$ , unless otherwise notes)

| Rating   | Symbol                 | Value      |        | Unit               |   |
|--|------------------------|------------|--------|--------------------|---|
|  |                        | DNF5*6     | DNF3*3 |                    |   |
| Drain-source voltage   | $V_{DS}$               | 30         |        | V                  |   |
| Gate-source voltage  | $V_{GS}$               | $\pm 20$   |        | V                  |   |
| Continuous drain current <sup>4)</sup>                           | $I_D$                  | 50         | 50     | A                  |   |
| Pulsed drain current <sup>1,4)</sup>                             | $I_{DM}$               | 200        | 200    | A                  |   |
| Maximum power dissipation  | $T_A=25^\circ\text{C}$ | $P_D$      | 46     | 28                 | W |
|  | $T_A=75^\circ\text{C}$ | $P_D$      | 17.9   | 11.1               | W |
| Operating junction and storage temperature range                 | $T_J/T_{STG}$          | -55 to 150 |        | $^\circ\text{C}$   |   |
| Junction-to-case thermal resistance                              | $R_{\theta JC}$        | 2.71       | 4.46   | $^\circ\text{C/W}$ |   |
| Junction-to ambient thermal resistance (PCB mount) <sup>2)</sup> | $R_{\theta JA}$        | 47         | 72     | $^\circ\text{C/W}$ |   |

- Note: 1. Repetitive rating; pulse width limited by the maximum junction temperature  
 2. 1-in<sup>2</sup> 2oz Cu PCB board  
 3. Guaranteed by design; not subject to production testing  
 4. Drain current limited by maximum junction temperature.

## 6. Typical application circuit



## 7. Electrical characteristics

(Ta=25°C, unless otherwise notes)

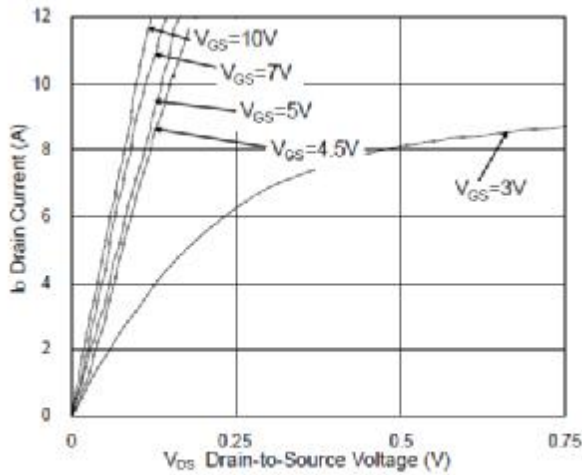
| Parameter                        | Symbol       | Test conditions  | Min. | Typ. | Max. | Units |    |
|----------------------------------|--------------|--|------|------|------|-------|----|
| <b>Static</b>                    |              |  |      |      |      |       |    |
| Drain-source breakdown voltage   | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$  | 30   | -    | -    | V     |    |
| Drain-source on-state resistance | $R_{DS(ON)}$ | $V_{GS}=4.5V, I_D=25A$   | -    | 11.5 | 14   | mΩ    |    |
|                                  |              | $V_{GS}=10V, I_D=25A$  | -    | 7.5  | 9.0  | mΩ    |    |
| Gate threshold voltage           | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=-250\mu A$   | 1    | 1.5  | 3    | V     |    |
| Forward transconductance         | $g_{fs}$     | $V_{DS}=15V, I_D=15A$  | -    | 12   | -    | S     |    |
| Zero gate voltage drain current  | $I_{DSS}$    | $V_{DS}=25V, V_{GS}=0V$  | -    | -    | 1    | μA    |    |
| Gate-source forward leakage      | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$  | -    | -    | ±100 | nA    |    |
| <b>Dynamic<sup>3)</sup></b>      |              |  |      |      |      |       |    |
| Total gate charge                | $Q_g$        | $I_D=35A$<br>$V_{DS}=15V$<br>$V_{GS}=10V$                                    | -    | 10   |      | nC    |    |
| Gate-source charge               | $Q_{gs}$     |  |      | 3.5  |      | nC    |    |
| Gate-drain ("miller") charge     | $Q_{gd}$     |  |      | -    | 3    |       | nC |
| Turn-on delay time               | $t_{d(off)}$ | $V_{DD}=15V$<br>$I_D=1A$<br>$R_G=6\Omega$<br>$R_L=15\Omega$<br>$V_{GEN}=10V$ | -    | 12   | -    | ns    |    |
| Rise time                        | $t_r$        |  |      | -    | 4    | -     | ns |
| Turn-off delay time              | $t_{d(off)}$ |  |      | -    | 32   | -     | ns |
| Fall time                        | $t_f$        |  |      | -    | 6    | -     | ns |
| Input capacitance                | $C_{iss}$    | $V_{GS}=0V$<br>$V_{DS}=15V$<br>$f=1.0MHz$                                    | -    | 1300 | -    | pF    |    |
| Output capacitance               | $C_{oss}$    |  |      | -    | 270  | -     | pF |
| Reverse transfer capacitance     | $C_{rss}$    |  |      | -    | 145  | -     | pF |

### Source-drain diode

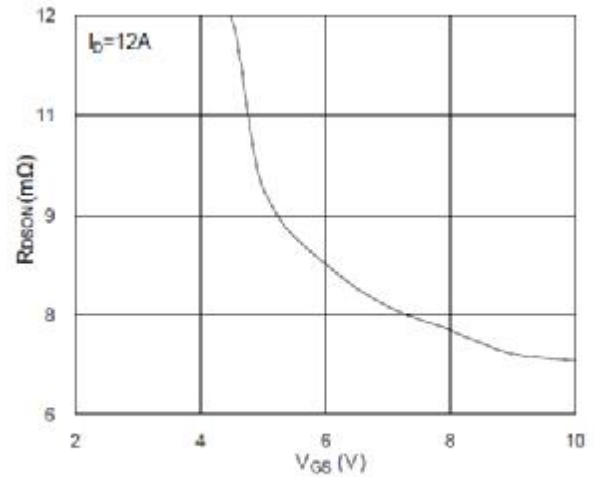
| Parameter                  | Symbol   | Test condition       | Min. | Typ. | Max. | Units |
|----------------------------|----------|----------------------|------|------|------|-------|
| Diode forward voltage      | $V_{SD}$ | $I_S=20A, V_{GS}=0V$ | -    | 0.87 | 1.5  | V     |
| Max. diode forward current | $I_S$    |                      | -    | -    | 20   | A     |

Notes: Pulse width ≤ 300μs, duty cycle ≤ 2%

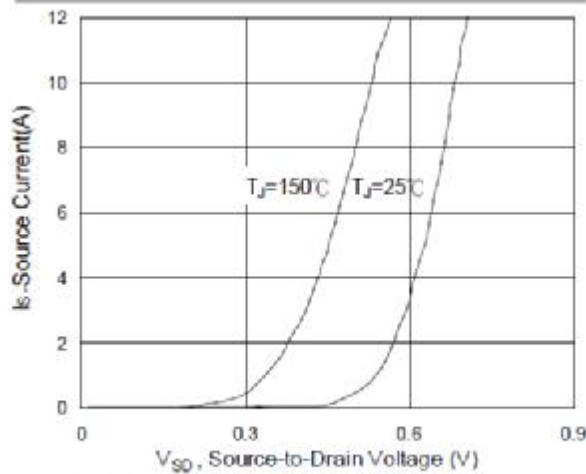
**8. Test circuits and waveforms**



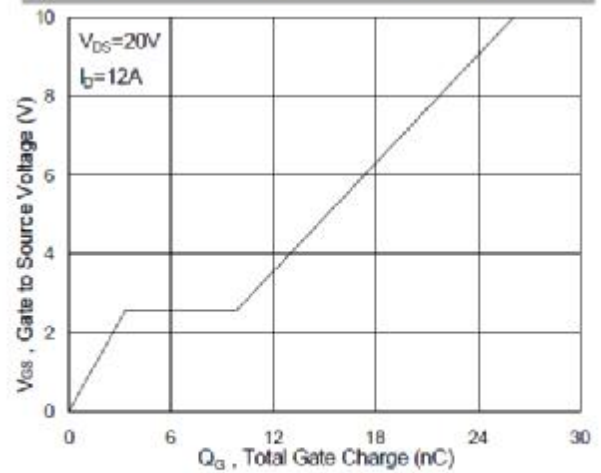
**Fig.1 Typical Output Characteristics**



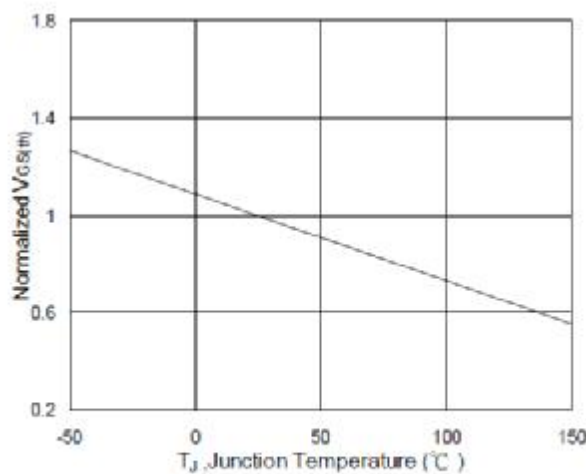
**Fig.2 On-Resistance vs. G-S Voltage**



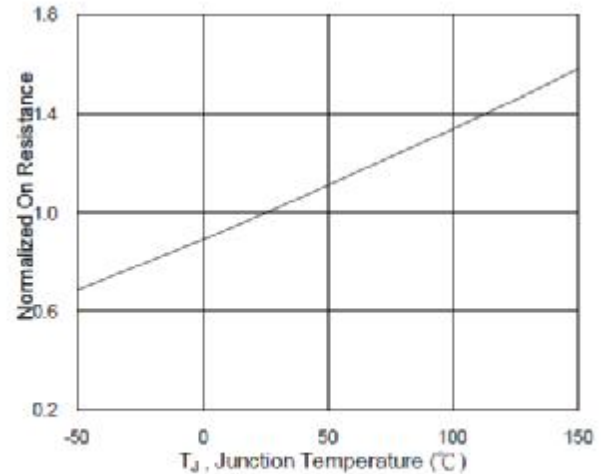
**Fig.3 Forward Characteristics of Reverse**



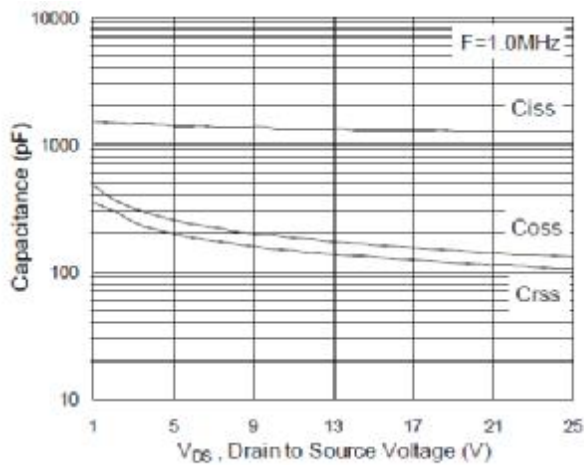
**Fig.4 Gate-Charge Characteristics**



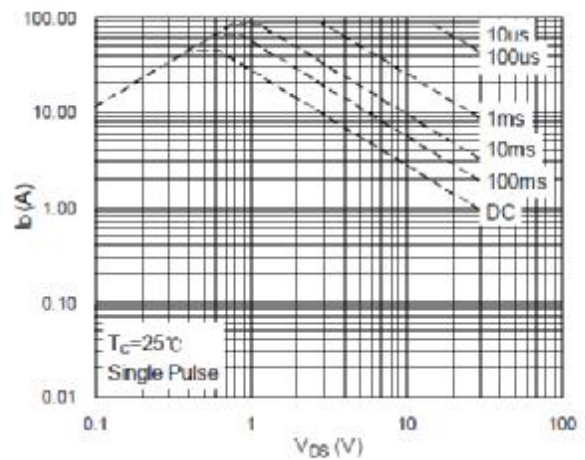
**Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$**



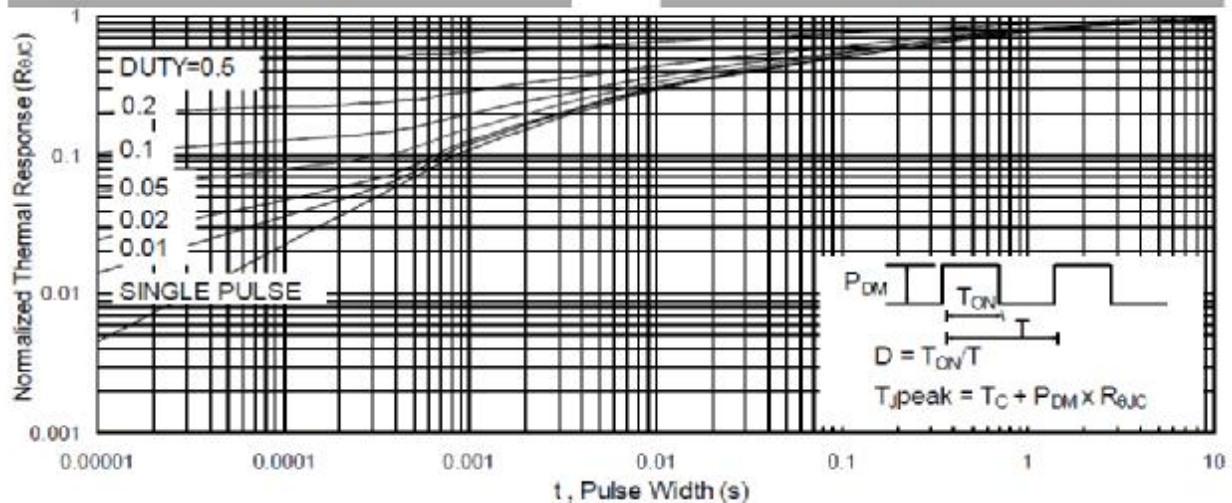
**Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$**



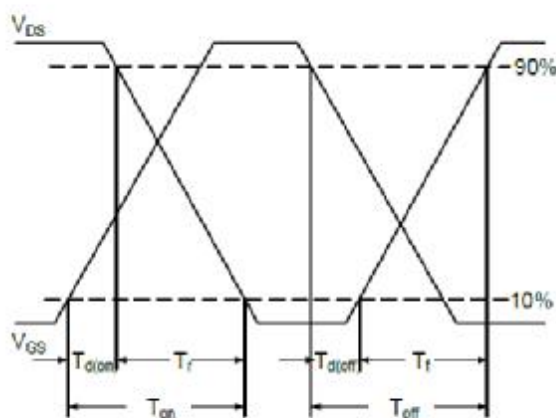
**Fig.7 Capacitance**



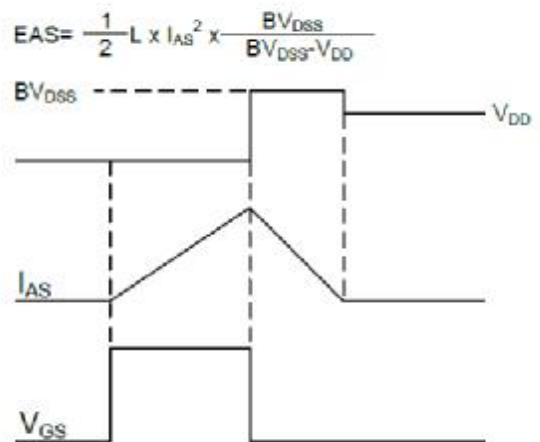
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**



**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Switching Waveform**