

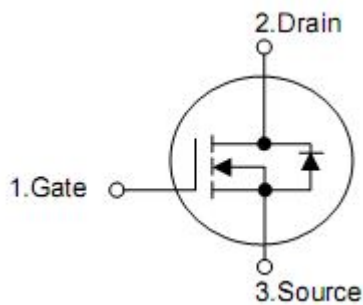
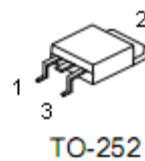
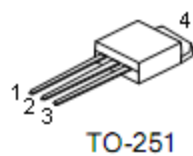
1. Description

KIA7610A designed by the trench processing techniques to achieve extremely low on-resistance. Additional features of this design are a 175°C junction operating temperature, fast switching speed and improved repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in DC-DC Converters and Off-line UPS and a wide variety of other applications.

2. Features

- $R_{DS(on)} = 32m\ \Omega$
- Low On-resistance
- Fast switching
- 100% avalanche tested
- Repetitive avalanche allowed up to t_{jmax}
- LeAT-Free, RoHS compliant

3. Pin configuration



| Pin | Function |
|-----|----------|
| 1 | Gate |
| 2 | Drain |
| 3 | Source |
| 4 | Drain |

4. Absolute maximum ratings

 ($T_C=25^{\circ}\text{C}$, unless otherwise noted)

| Parameter | Symbol | Rating | Units |
|--|-----------|---------------------------|--------------------|
| Drain-source voltage | V_{DSS} | 100 | V |
| Drain current continuous | I_D | $T_C=25^{\circ}\text{C}$ | A |
| | | $T_C=100^{\circ}\text{C}$ | A |
| Drain current pulsed (note1) | I_{DM} | 100 | A |
| Gate-source voltage | V_{GSS} | ± 20 | V |
| Single Pulse avalanche energy (note2) | E_{AS} | 90 | mJ |
| Power dissipation | P_D | 60 | W |
| Maximum junction temperature | T_J | 175 | $^{\circ}\text{C}$ |
| Operating and storage temperature range | T_{STG} | -55~+175 | $^{\circ}\text{C}$ |
| Diode continuous forward current (note1) | I_S | 25 | A |

5. Thermal characteristics

| Parameter | Symbol | Typ | Max | Unit |
|-------------------------------------|------------|-----|-----|-----------------------------|
| Thermal resistance junction-case | R_{thJC} | - | 1.8 | $^{\circ}\text{C}/\text{W}$ |
| Thermal resistance junction-ambient | R_{thJA} | - | 75 | |

6. Electrical characteristics

(T_J=25°C, unless otherwise noted)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|------------------------------------|---------------------|--|-----|------|------|-------|
| Off characteristics | | | | | | |
| Drain-source breakdown voltage | BV _{DSS} | V _{GS} =0V, I _D =250μA | 100 | - | - | V |
| Zero gate voltage drain current | I _{DSS} | T _C =25°C | - | - | 10 | μA |
| | | T _C =125°C | - | - | 100 | μA |
| Gate-body leakage current | I _{GSS} | V _{GS} =±20V, V _{DS} =0V | - | - | ±100 | nA |
| On characteristics | | | | | | |
| Gate threshold voltage | V _{GS(TH)} | V _{DS} =V _{GS} , I _D =250μA | 1.0 | 1.5 | 3.0 | V |
| Static drain-source on-resistance | R _{DS(ON)} | V _{GS} =10V, I _D =14A | - | 32 | 38 | mΩ |
| Dynamic characteristics | | | | | | |
| Input capacitance | C _{ISS} | V _{DS} =50V, V _{GS} =0V, f=1MHz | - | 2020 | - | pF |
| Output capacitance | C _{OSS} | | - | 450 | - | pF |
| Reverse transfer capacitance | C _{RSS} | | - | 255 | - | pF |
| Switching characteristics | | | | | | |
| Turn-on delay time | t _{D(ON)} | V _{DD} =50V, R _G =6.8Ω, I _D =1A, V _{GS} =10V, R _L =25Ω, | - | 25 | - | ns |
| Rise time | t _R | | - | 19 | - | ns |
| Turn-off delay time | t _{D(OFF)} | | - | 58 | - | ns |
| Fall time | t _F | | - | 75 | - | ns |
| Total gate charge | Q _G | V _{DS} =50V, V _{GS} =10V I _D =10A | - | 55 | - | nC |
| Gate-source charge | Q _{GS} | | - | 13.6 | - | nC |
| Gate-drain charge | Q _{GD} | | - | 11.2 | - | nC |
| Drain-source diode characteristics | | | | | | |
| Continuous drain-source current | I _S | | - | - | 25 | A |
| Drain-source diode forward voltage | V _{SD} | V _{GS} =0V, I _S =12A | - | 0.82 | 1.3 | V |
| Reverse recovery time | t _{RR} | V _{GS} =0V, I _F =12A, di _F /dt=100A/μs | - | 60 | - | nS |
| Reverse recovery charge | Q _{RR} | | - | 95 | - | nC |

Note: 1. Pulse width ≤300μs, duty cycle ≤2% pulse width limited by maximum junction temperature

2. Limited by T_{Jmax}, starting T_J=25°C, L=0.5mH, R_G=25Ω, I_{AS}=19A, V_{GS}=10V

7. Test circuits and waveforms

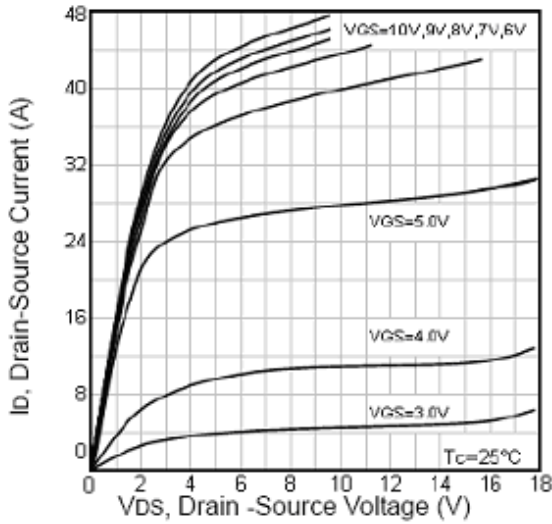


Fig1. Typical Output Characteristics

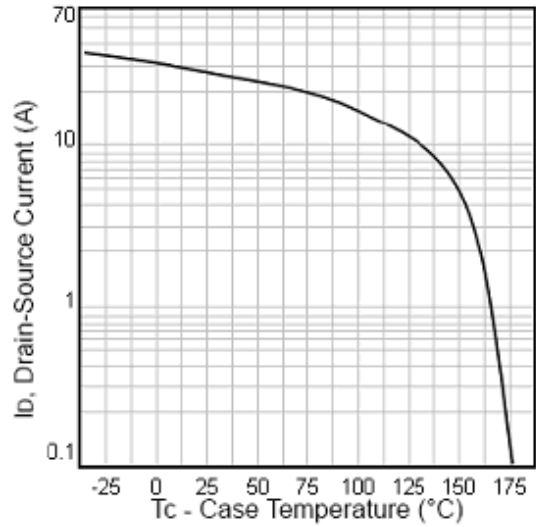


Fig2. Maximum Drain Current Vs. Case Temperature

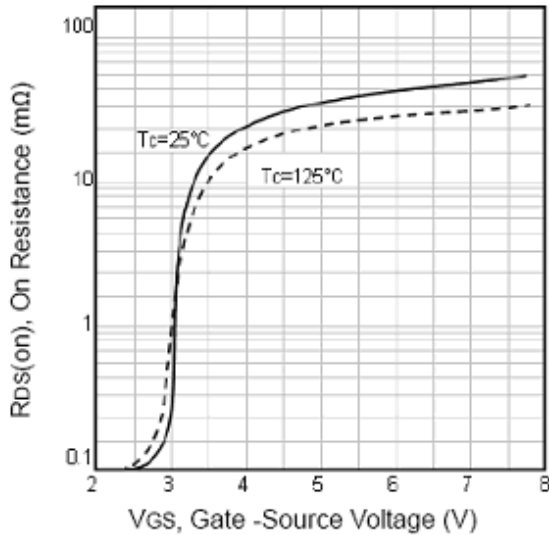


Fig3. Typical On Resistance Vs. Gate-Source

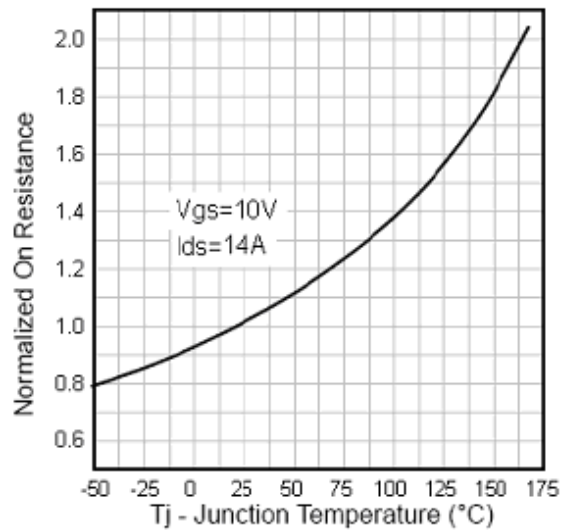


Fig4. Normalized On-Resistance Vs. Temperature

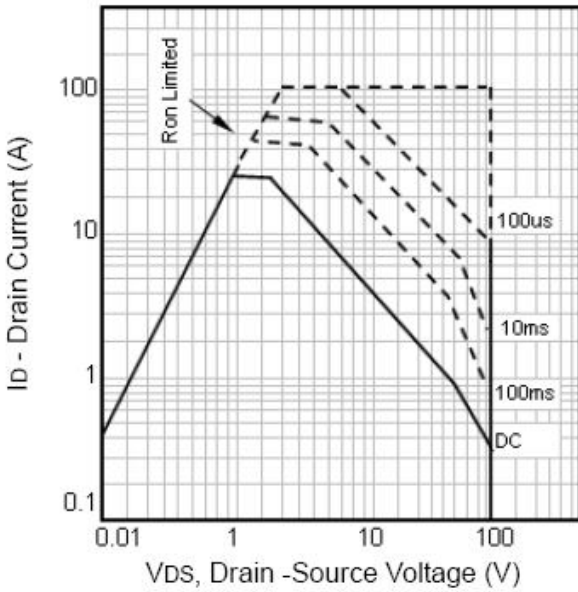


Fig5. Maximum Safe Operating Area

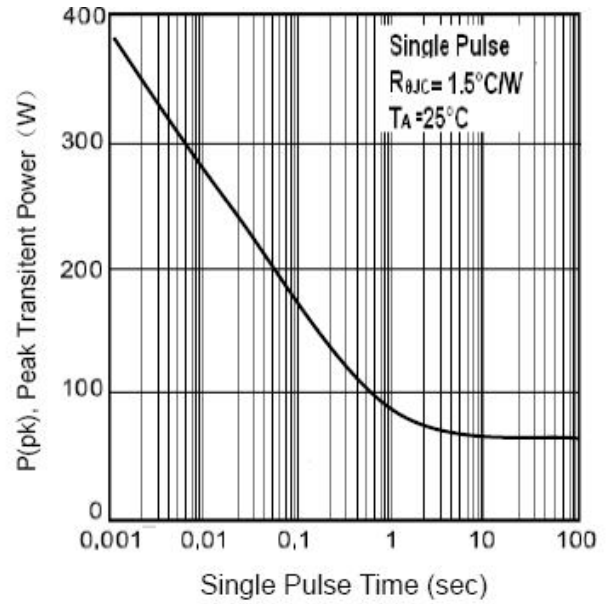


Fig6. Typical Transient Power

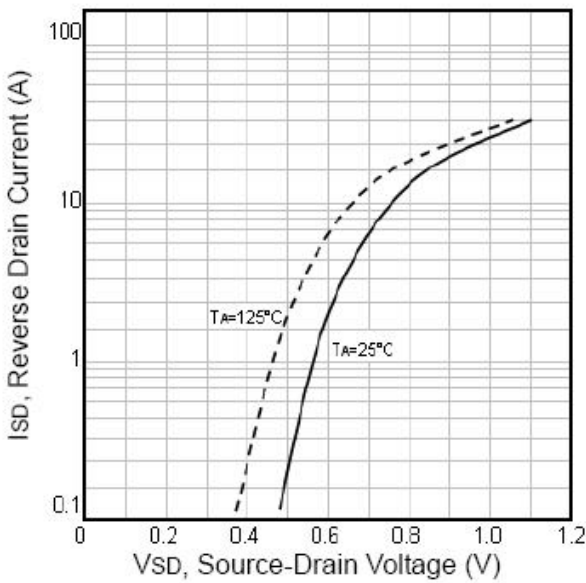


Fig7. Typical Source-Drain Diode Forward Voltage

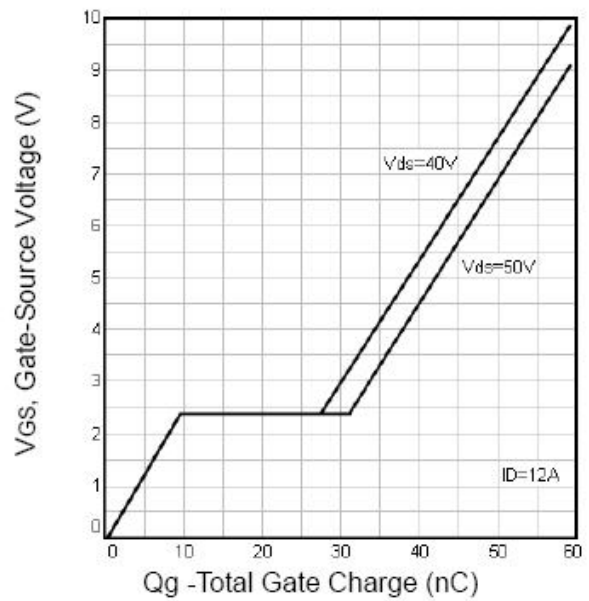


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

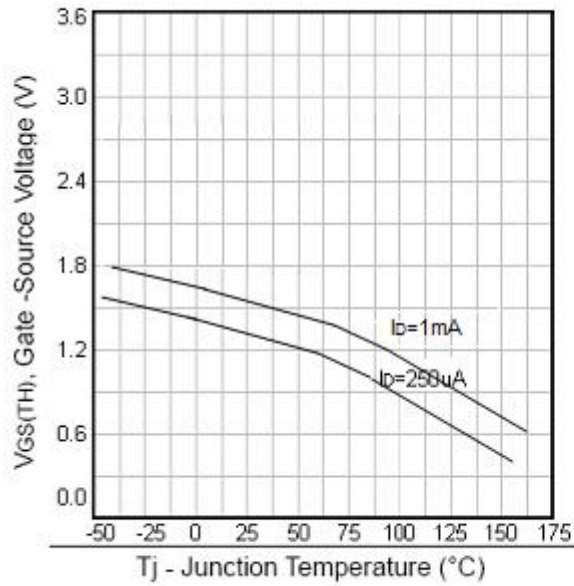


Fig9. Threshold Voltage Vs. Temperature

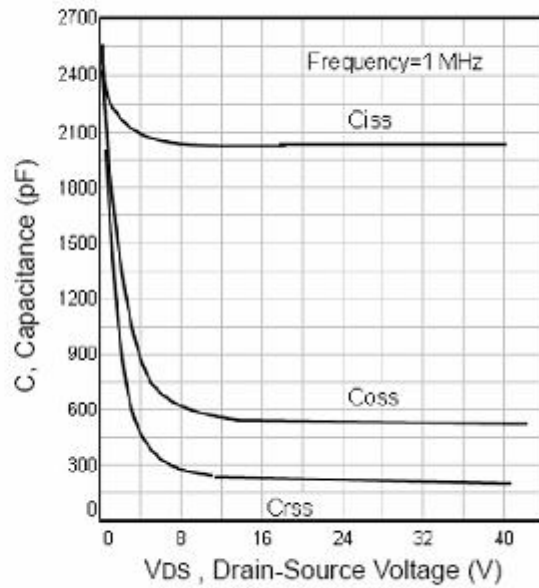


Fig10. Typical Capacitance Vs. Drain-Source Voltage

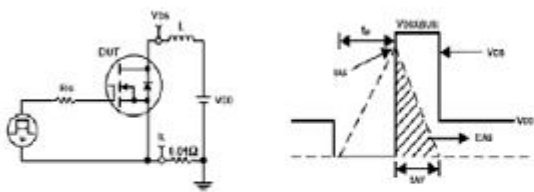


Fig11. Unclamped Inductive Test Circuit and waveforms

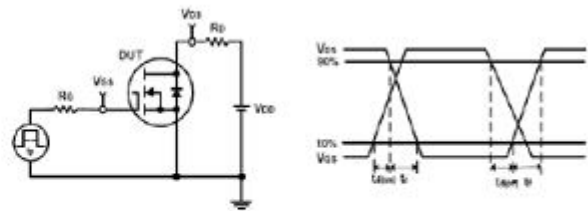


Fig12. Switching Time Test Circuit and waveforms