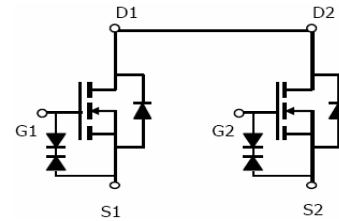


## N-Channel Enhancement Mode Power MOSFET

### Description

The FNK0203E uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications. It is ESD protected.



Schematic diagram

### General Features

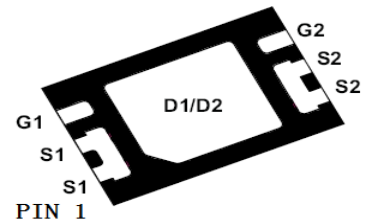
- $V_{DS} = 20V, I_D = 7A$
- $R_{DS(ON)} < 26 m\Omega @ V_{GS} = 2.5V$
- $R_{DS(ON)} < 22 m\Omega @ V_{GS} = 4.5V$
- ESD Rating: 2200V HBM
- High Power and current handling capability
- Lead free product is acquired
- Surface Mount Package

### Application

- PWM application
- Load switch



Marking and pin Assignment



### Absolute Maximum Ratings (TA=25°C unless otherwise noted)

| Parameter  | Symbol         | Limit      | Unit |
|--|----------------|------------|------|
| Drain-Source Voltage                             | $V_{DS}$       | 20         | V    |
| Gate-Source Voltage                              | $V_{GS}$       | $\pm 12$   | V    |
| Drain Current-Continuous                         | $I_D$          | 7          | A    |
| Drain Current-Pulsed (Note 1)                    | $I_{DM}$       | 30         | A    |
| Maximum Power Dissipation                        | $P_D$          | 1.5        | W    |
| Operating Junction and Storage Temperature Range | $T_J, T_{STG}$ | -55 To 150 | °C   |

### Thermal Characteristic

|  |                 |      |      |
|--|-----------------|------|------|
| Thermal Resistance, Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 83.3 | °C/W |
|--|-----------------|------|------|

### Electrical Characteristics (TA=25°C unless otherwise noted)

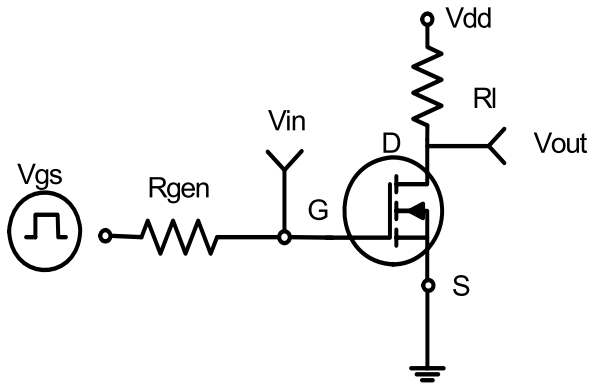
| Parameter                       | Symbol     | Condition                     | Min | Typ | Max | Unit    |
|---------------------------------|------------|-------------------------------|-----|-----|-----|---------|
| <b>Off Characteristics</b>      |            |                               |     |     |     |         |
| Drain-Source Breakdown Voltage  | $BV_{DSS}$ | $V_{GS} = 0V, I_D = 250\mu A$ | 20  |     | -   | V       |
| Zero Gate Voltage Drain Current | $I_{DSS}$  | $V_{DS} = 20V, V_{GS} = 0V$   | -   | -   | 1   | $\mu A$ |

|   |              |  |      |      |          |            |
|---|--------------|--|------|------|----------|------------|
| Gate-Body Leakage Current                 | $I_{GSS}$    | $V_{GS}=\pm 10V, V_{DS}=0V$                                  | -    | -    | $\pm 10$ | $\mu A$    |
| <b>On Characteristics (Note 3)</b>        |              |  |      |      |          |            |
| Gate Threshold Voltage                    | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$                                | 0.55 | 0.7  | 0.95     | V          |
| Drain-Source On-State Resistance          | $R_{DS(ON)}$ | $V_{GS}=4.5V, I_D=6.5A$                                      | -    | 15   | 22       | m $\Omega$ |
|   |              | $V_{GS}=2.5V, I_D=5.5A$                                      | -    | 20   | 26       | m $\Omega$ |
| Forward Transconductance                  | $g_{FS}$     | $V_{DS}=5V, I_D=7A$  | -    | 20   | -        | S          |
| <b>Dynamic Characteristics (Note4)</b>    |              |  |      |      |          |            |
| Input Capacitance                         | $C_{iss}$    | $V_{DS}=10V, V_{GS}=0V,$<br>$F=1.0MHz$                       | -    | 1150 | -        | PF         |
| Output Capacitance                        | $C_{oss}$    |  | -    | 185  | -        | PF         |
| Reverse Transfer Capacitance              | $C_{rss}$    |  | -    | 145  | -        | PF         |
| <b>Switching Characteristics (Note 4)</b> |              |  |      |      |          |            |
| Turn-on Delay Time                        | $t_{d(on)}$  | $V_{DD}=10V, R_L=1.35\Omega$<br>$V_{GS}=5V, R_{GEN}=3\Omega$ | -    | 6    |          | nS         |
| Turn-on Rise Time                         | $t_r$        |  | -    | 13   |          | nS         |
| Turn-Off Delay Time                       | $t_{d(off)}$ |  | -    | 52   |          | nS         |
| Turn-Off Fall Time                        | $t_f$        |  | -    | 16   |          | nS         |
| Total Gate Charge                         | $Q_g$        | $V_{DS}=10V, I_D=7A,$<br>$V_{GS}=4.5V$                       | -    | 15   |          | nC         |
| Gate-Source Charge                        | $Q_{gs}$     |  | -    | 0.8  | -        | nC         |
| Gate-Drain Charge                         | $Q_{gd}$     |  | -    | 3.2  | -        | nC         |
| <b>Drain-Source Diode Characteristics</b> |              |  |      |      |          |            |
| Diode Forward Voltage (Note 3)            | $V_{SD}$     | $V_{GS}=0V, I_S=1A$  | -    | -    | 1.2      | V          |
| Diode Forward Current (Note 2)            | $I_S$        |  | -    | -    | 7        | A          |

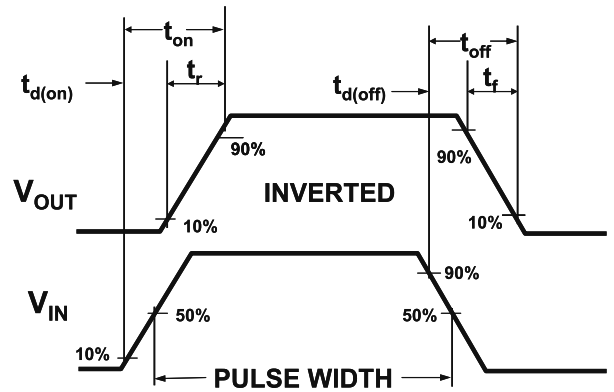
### Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production

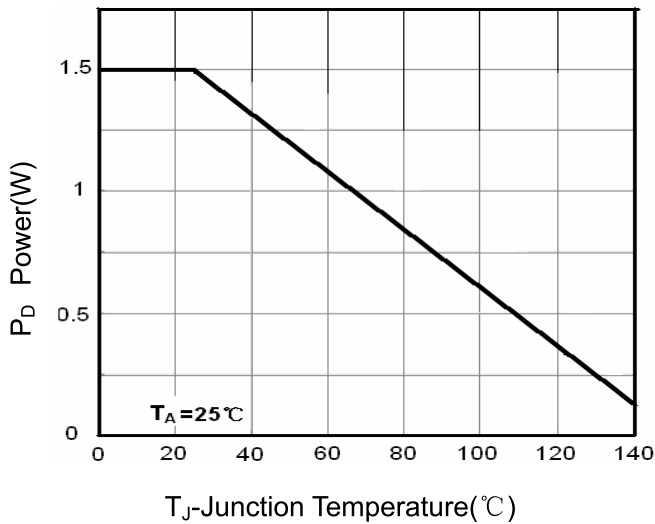
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



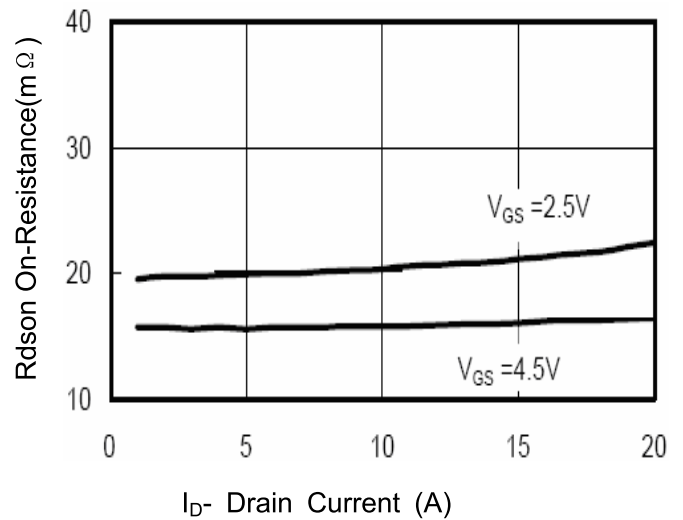
**Figure 1: Switching Test Circuit**



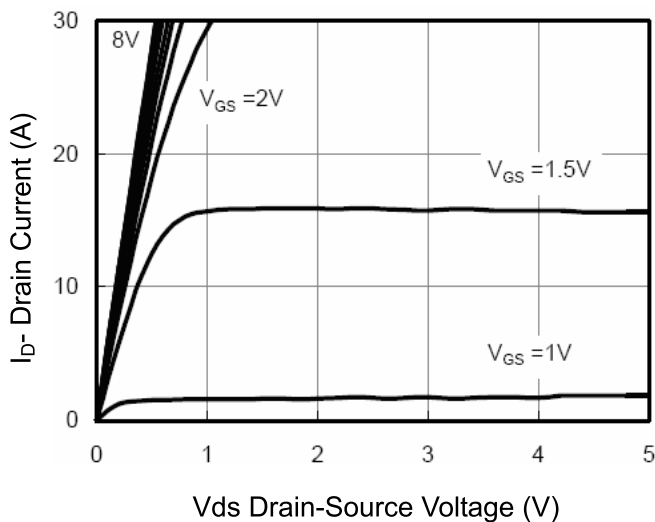
**Figure 2: Switching Waveforms**



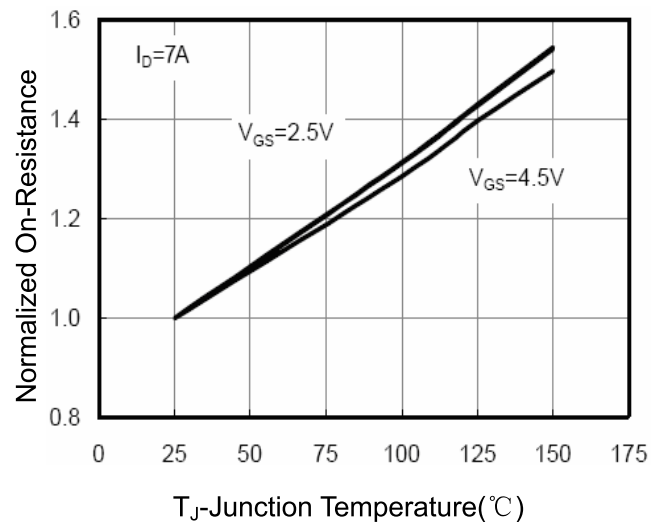
**Figure 3 Power Dissipation**



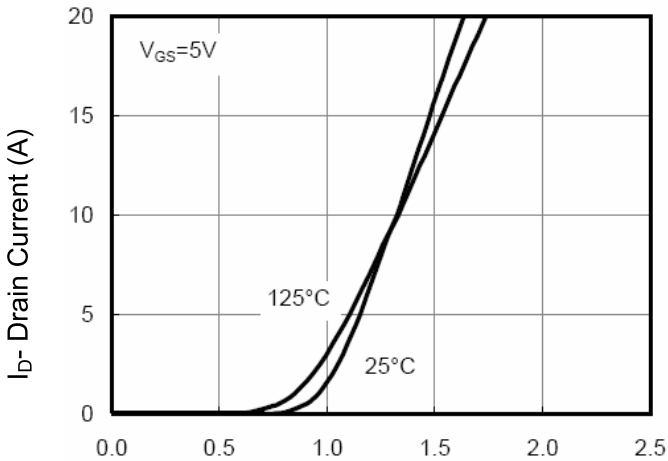
**Figure 6 Drain-Source On-Resistance**



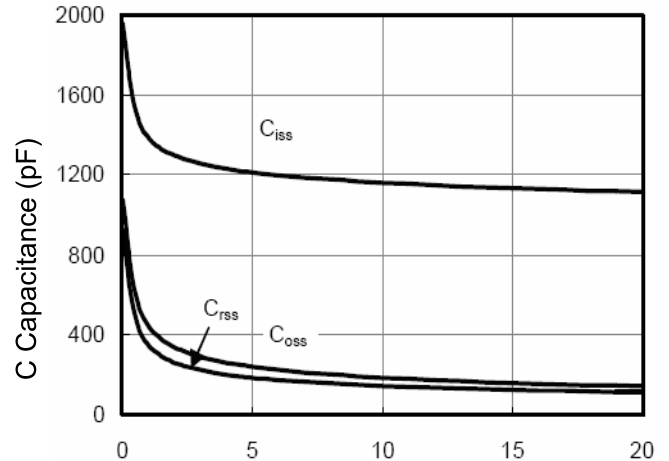
**Figure 5 Output CHARACTERISTICS**



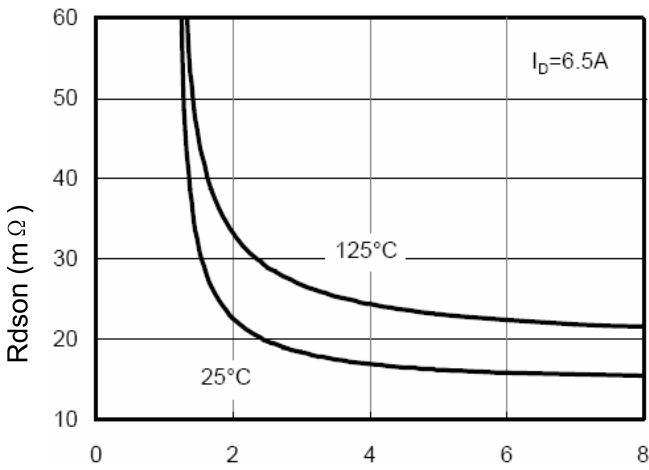
**Figure 8 Drain-Source On-Resistance**



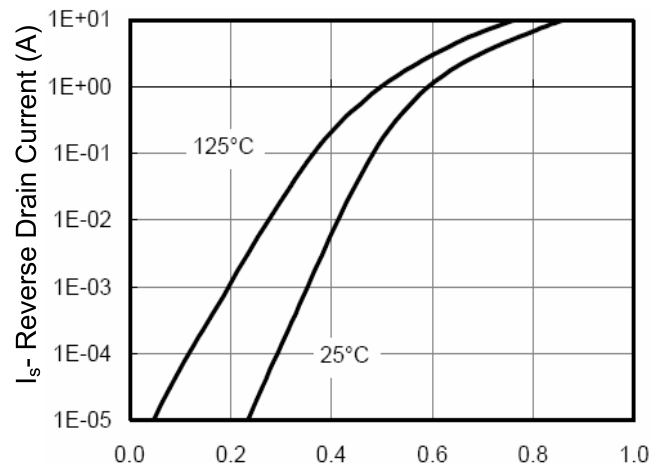
Vgs Gate-Source Voltage (V)  
**Figure 7 Transfer Characteristics**



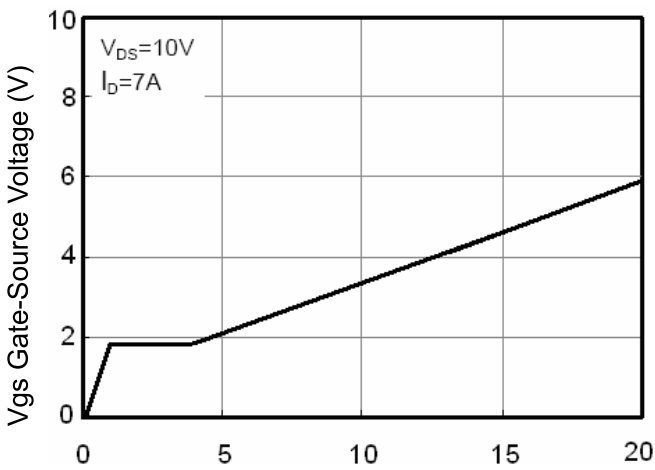
Vds Drain-Source Voltage (V)  
**Figure 8 Capacitance vs Vds**



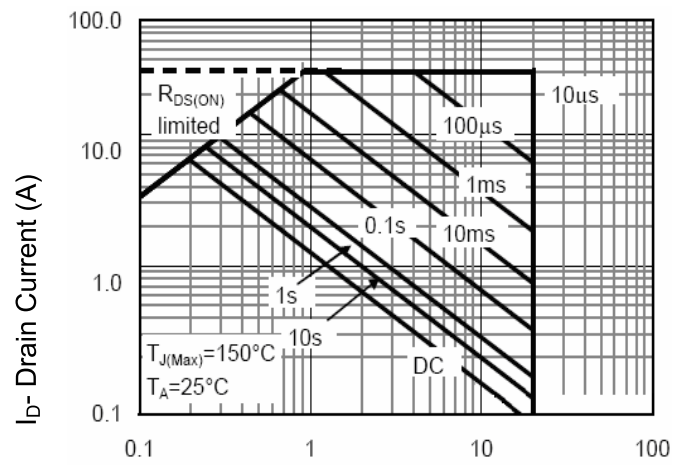
Vgs Gate-Source Voltage (V)  
**Figure 9 Rdson vs Vgs**



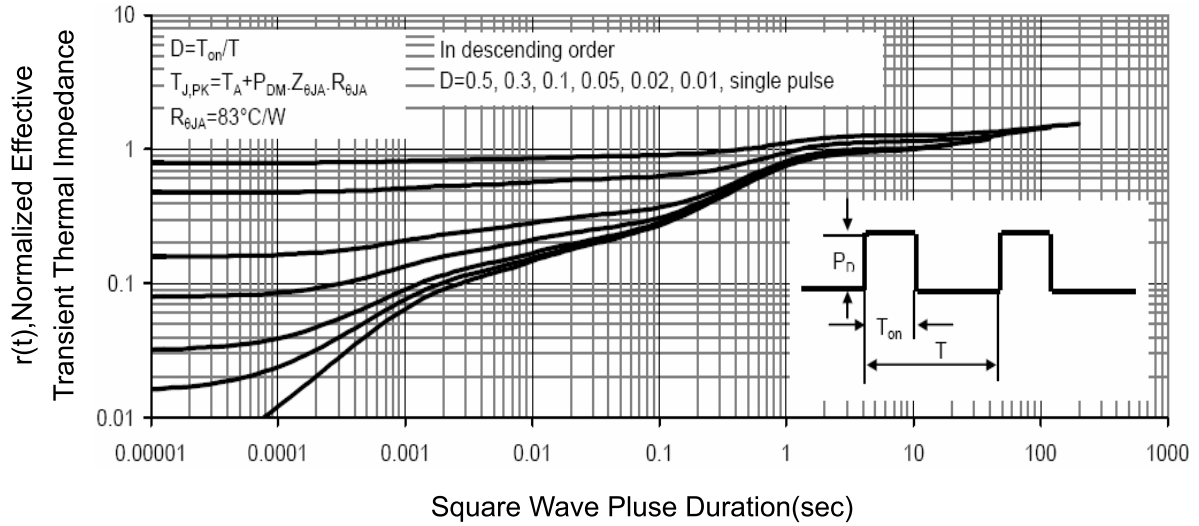
Vds Drain-Source Voltage (V)  
**Figure 10 Capacitance vs Vds**



Qg Gate Charge (nC)  
**Figure 11 Gate Charge**



Vds Drain-Source Voltage (V)  
**Figure 13 Safe Operation Area**



**Figure 14 Normalized Maximum Transient Thermal Impedance**

封装外形尺寸图

| 符号 | 单位: mm      |      |      |
|----|-------------|------|------|
|    | MIN         | NOM  | MAX  |
| A  | 1.95        | 2.00 | 2.05 |
| B  | 2.95        | 3.00 | 3.05 |
| C  | 1.45        | 1.50 | 1.55 |
| D  | 1.65        | 1.70 | 1.75 |
| E  | 0.33        | 0.38 | 0.43 |
| F  | 0.25        | 0.30 | 0.35 |
| G  | 0.20        | 0.25 | 0.30 |
| H  | 0.35        | 0.40 | 0.45 |
| I  | 0.2 BSC     |      |      |
| J  | 0.75        | 0.80 | 0.85 |
| J1 | 0-0.05      |      |      |
| K  | 0.3×45° BSC |      |      |
| L  | 0.5 BSC     |      |      |
| M  | 0.70        | 0.75 | 0.80 |
| N  | 0.10        | 0.15 | 0.20 |

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