

## Description

The G110N06. uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

## General Features

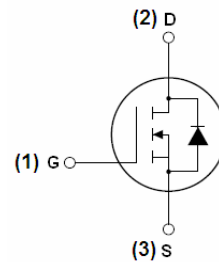


| $V_{DSS}$ | $R_{DS(ON)}$<br>@ 4.5V (Typ) | $R_{DS(ON)}$<br>@ 10V (Typ) | $I_D$ |
|-----------|------------------------------|-----------------------------|-------|
| 55V       | 5.8 m $\Omega$               | 5.4m $\Omega$               | 110A  |

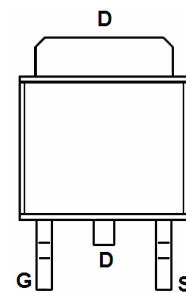
- High density cell design for ultra low  $R_{DS(on)}$
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high  $E_{AS}$
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

## Application

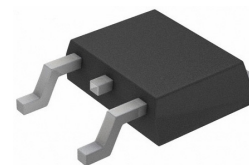
- Power switching application
- LED backlighting
- Uninterruptible power supply



Schematic diagram



Marking and pin assignment



TO-252

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

| Parameter                                             | Symbol                     | Limit      | Unit                  |
|-------------------------------------------------------|----------------------------|------------|-----------------------|
| Drain-Source Voltage                                  | $V_{DS}$                   | 55         | V                     |
| Gate-Source Voltage                                   | $V_{GS}$                   | $\pm 20$   | V                     |
| Drain Current-Continuous                              | $I_D$                      | 110        | A                     |
| Drain Current-Continuous( $T_C=100^{\circ}\text{C}$ ) | $I_D(100^{\circ}\text{C})$ | 85         | A                     |
| Pulsed Drain Current                                  | $I_{DM}$                   | 330        | A                     |
| Maximum Power Dissipation                             | $P_D$                      | 130        | W                     |
| Debating factor                                       |                            | 0.87       | W/ $^{\circ}\text{C}$ |
| Single pulse avalanche energy <sup>(Note 5)</sup>     | $E_{AS}$                   | 650        | mJ                    |
| Operating Junction and Storage Temperature Range      | $T_J, T_{STG}$             | -55 To 175 | $^{\circ}\text{C}$    |

**Thermal Characteristic**

|                                                          |                 |      |      |
|----------------------------------------------------------|-----------------|------|------|
| Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup> | $R_{\theta JC}$ | 1.15 | °C/W |
|----------------------------------------------------------|-----------------|------|------|

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

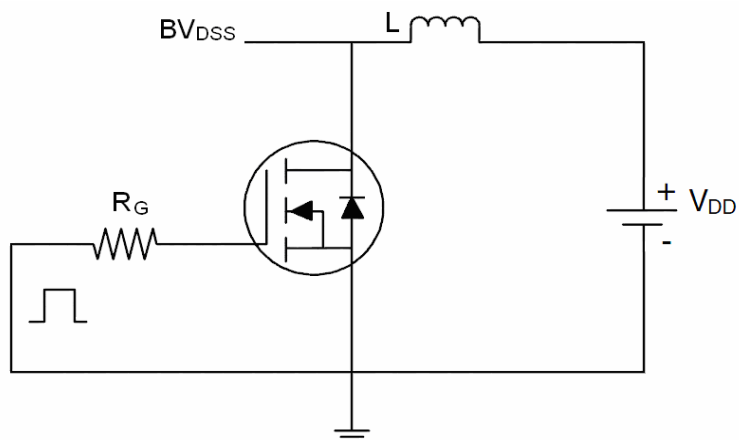
| Parameter                                     | Symbol              | Condition                                                                                                  | Min | Typ  | Max  | Unit |
|-----------------------------------------------|---------------------|------------------------------------------------------------------------------------------------------------|-----|------|------|------|
| Off Characteristics                           |                     |                                                                                                            |     |      |      |      |
| Drain-Source Breakdown Voltage                | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V I <sub>D</sub> =250μA                                                                  | 55  | -    | -    | V    |
| Zero Gate Voltage Drain Current               | I <sub>DSS</sub>    | V <sub>DS</sub> =55V, V <sub>GS</sub> =0V                                                                  | -   | -    | 1    | μA   |
| Gate-Body Leakage Current                     | I <sub>GSS</sub>    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                                                 | -   | -    | ±100 | nA   |
| On Characteristics <sup>(Note 3)</sup>        |                     |                                                                                                            |     |      |      |      |
| Gate Threshold Voltage                        | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                                   | 1   | 1.2  | 1.6  | V    |
| Drain-Source On-State Resistance              | R <sub>DS(ON)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =30A                                                                  | -   | 5.4  | 6.0  | mΩ   |
| Drain-Source On-State Resistance              | R <sub>DS(ON)</sub> | V <sub>GS</sub> =4.5V, I <sub>D</sub> =30A                                                                 | -   | 5.8  | 6.5  | mΩ   |
| Forward Transconductance                      | g <sub>FS</sub>     | V <sub>DS</sub> =5V, I <sub>D</sub> =30A                                                                   | 20  | -    | -    | S    |
| Dynamic Characteristics <sup>(Note4)</sup>    |                     |                                                                                                            |     |      |      |      |
| Input Capacitance                             | C <sub>iss</sub>    | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V,<br>F=1.0MHz                                                     | -   | 5400 | -    | PF   |
| Output Capacitance                            | C <sub>oss</sub>    |                                                                                                            | -   | 970  | -    | PF   |
| Reverse Transfer Capacitance                  | C <sub>rss</sub>    |                                                                                                            | -   | 380  | -    | PF   |
| Switching Characteristics <sup>(Note 4)</sup> |                     |                                                                                                            |     |      |      |      |
| Turn-on Delay Time                            | t <sub>d(on)</sub>  | V <sub>DD</sub> =30V, I <sub>D</sub> =2A, R <sub>L</sub> =1Ω<br>V <sub>GS</sub> =10V, R <sub>GEN</sub> =3Ω | -   | 16   | -    | nS   |
| Turn-on Rise Time                             | t <sub>r</sub>      |                                                                                                            | -   | 8    | -    | nS   |
| Turn-Off Delay Time                           | t <sub>d(off)</sub> |                                                                                                            | -   | 45   | -    | nS   |
| Turn-Off Fall Time                            | t <sub>f</sub>      |                                                                                                            | -   | 33   | -    | nS   |
| Total Gate Charge                             | Q <sub>g</sub>      | V <sub>DS</sub> =30V, I <sub>D</sub> =30A,<br>V <sub>GS</sub> =10V                                         | -   | 75   | -    | nC   |
| Gate-Source Charge                            | Q <sub>gs</sub>     |                                                                                                            | -   | 10.5 | -    | nC   |
| Gate-Drain Charge                             | Q <sub>gd</sub>     |                                                                                                            | -   | 17   | -    | nC   |
| Drain-Source Diode Characteristics            |                     |                                                                                                            |     |      |      |      |
| Diode Forward Voltage <sup>(Note 3)</sup>     | V <sub>SD</sub>     | V <sub>GS</sub> =0V, I <sub>S</sub> =30A                                                                   | -   | -    | 1.2  | V    |
| Diode Forward Current <sup>(Note 2)</sup>     | I <sub>S</sub>      |                                                                                                            | -   | -    | 110  | A    |
| Reverse Recovery Time                         | t <sub>rr</sub>     | T <sub>J</sub> = 25°C, I <sub>F</sub> =30A<br>di/dt = 100A/μs <sup>(Note3)</sup>                           | -   | 42   |      | nS   |
| Reverse Recovery Charge                       | Q <sub>rr</sub>     |                                                                                                            | -   | 45   |      | nC   |
| Forward Turn-On Time                          | t <sub>on</sub>     | Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)                                       |     |      |      |      |

**Notes:**

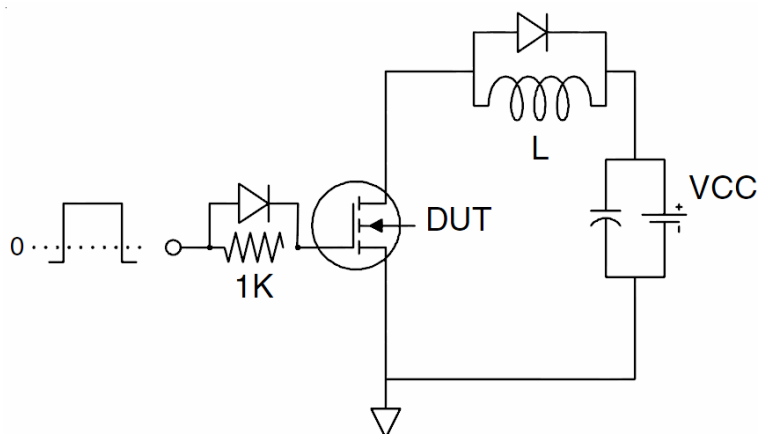
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production
5.  $E_{AS}$  condition:  $T_J=25^{\circ}\text{C}, V_{DD}=30V, V_G=10V, L=0.5mH, R_g=25\Omega$

## Test circuit

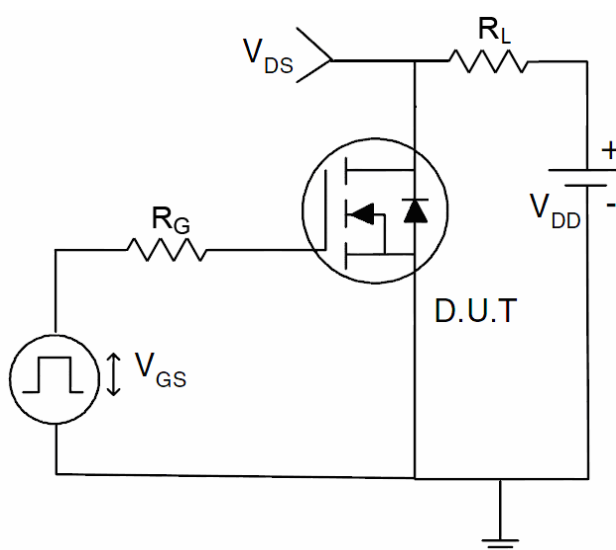
### 1) $E_{AS}$ test Circuits



### 2) Gate charge test Circuit



### 3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

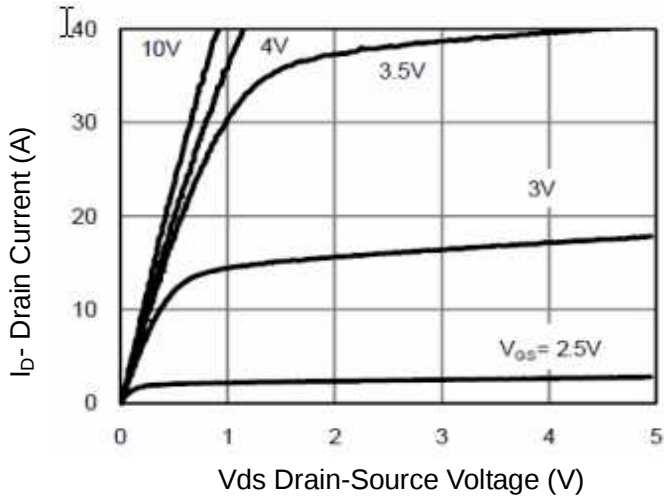


Figure 1 Output Characteristics

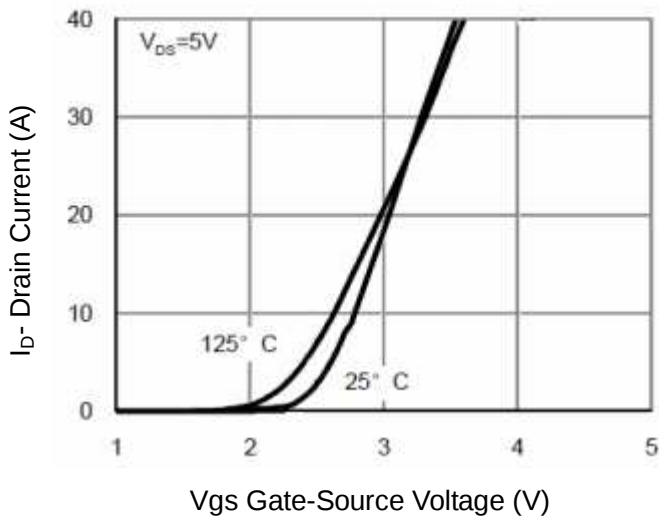


Figure 2 Transfer Characteristics

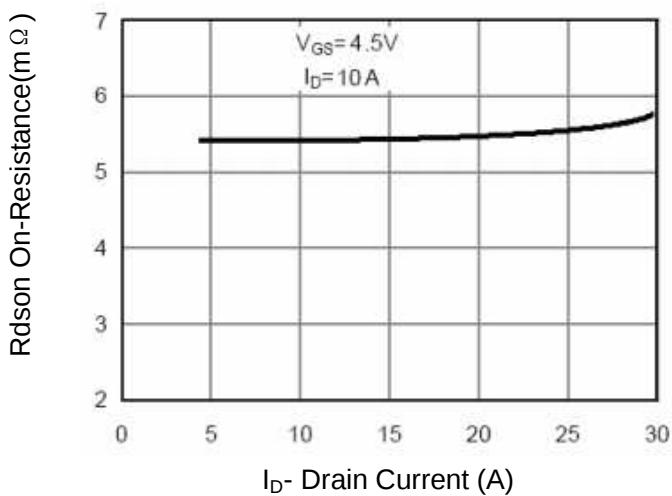


Figure 3  $R_{DS(on)}$ - Drain Current

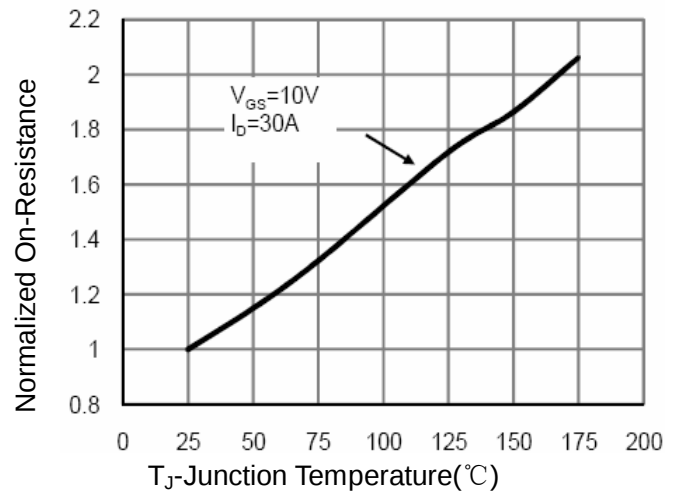


Figure 4  $R_{DS(on)}$ -Junction Temperature

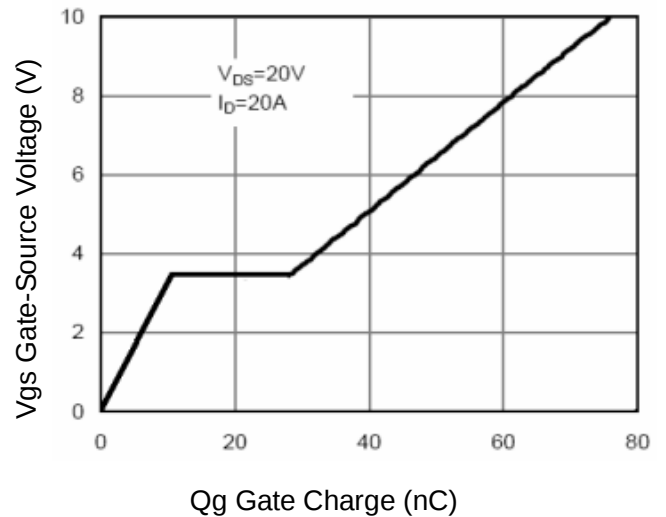


Figure 5 Gate Charge

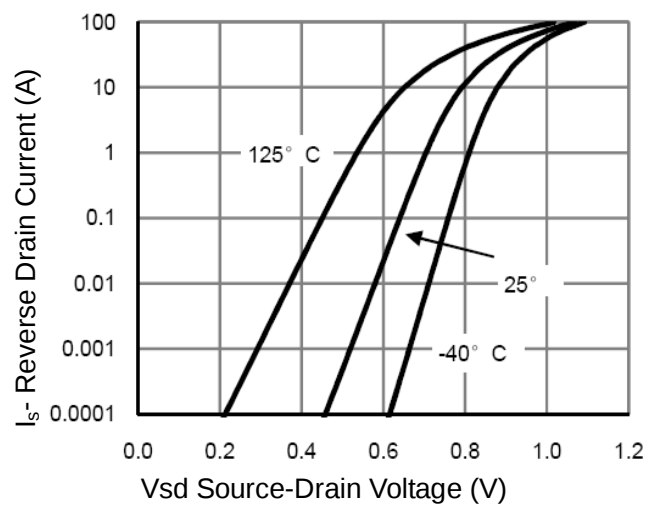


Figure 6 Source- Drain Diode Forward

