

Description

The G13N04 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.

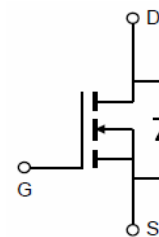
General Features

| V_{DSS} | $R_{DS(ON)}$ @ 4.5V (typ) | $R_{DS(ON)}$ @ 10V (typ) | I_D |
|-----------|------------------------------|-----------------------------|-------|
| 40V | 13 m Ω | 10 m Ω | 13A |

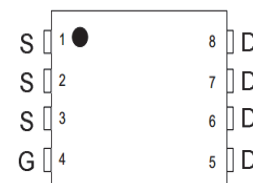
- High density cell design for ultra low $R_{ds(on)}$
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}

Application

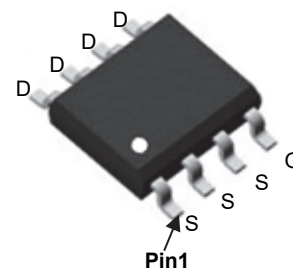
- Load switching
- Hard switched and high frequency circuits
- Quick charge application



Schematic diagram



Marking and pin Assignment



SOP-8 top view

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

| Parameter | Symbol | Limit | Unit |
|--|---------------------|------------|-------------|
| Drain-Source Voltage | V_{DS} | 40 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Drain Current-Continuous | I_D | 13 | A |
| Drain Current-Continuous($T_C=100^{\circ}C$) | $I_D(100^{\circ}C)$ | 8.2 | A |
| Pulsed Drain Current | I_{DM} | 52 | A |
| Maximum Power Dissipation | P_D | 3 | W |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 150 | $^{\circ}C$ |

Thermal Characteristic

| | | | |
|---|-----------------|-------|---------------|
| Thermal Resistance, Junction-to-Ambient ^(Note 2) | $R_{\theta JA}$ | 41.67 | $^{\circ}C/W$ |
|---|-----------------|-------|---------------|

Electrical Characteristics (T_A=25°C unless otherwise noted)

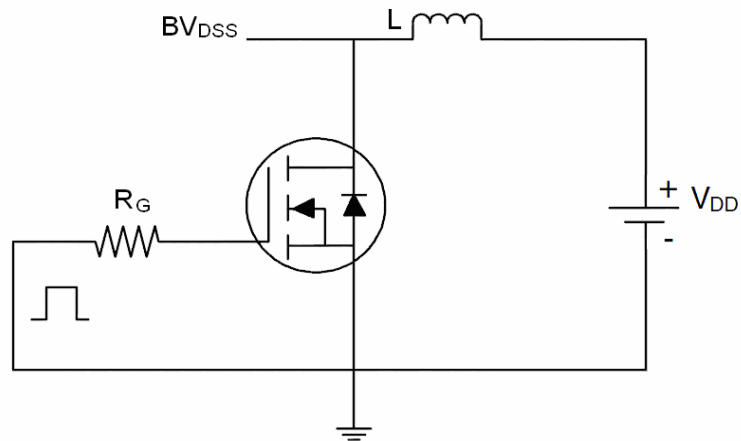
| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---------------------|--|-----|------|------|------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | V _{GS} =0V I _D =250μA | 40 | 46 | - | V |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} =40V, V _{GS} =0V | - | - | 1 | μA |
| Gate-Body Leakage Current | I _{GSS} | V _{GS} =±20V, V _{DS} =0V | - | - | ±100 | nA |
| On Characteristics (Note 3) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} =V _{GS} , I _D =250μA | 1.2 | 1.6 | 2.3 | V |
| Drain-Source On-State Resistance | R _{DS(ON)} | V _{GS} =10V, I _D =6.5A | - | 10 | 12 | mΩ |
| | | V _{GS} =4.5V, I _D =6.5A | - | 13 | 16 | mΩ |
| Forward Transconductance | g _{FS} | V _{DS} =5V, I _D =6.5A | | 75 | - | S |
| Dynamic Characteristics (Note4) | | | | | | |
| Input Capacitance | C _{iss} | V _{DS} =20V, V _{GS} =0V, F=1.0MHz | - | 1780 | - | PF |
| Output Capacitance | C _{oss} | | - | 209 | - | PF |
| Reverse Transfer Capacitance | C _{rss} | | - | 160 | - | PF |
| Switching Characteristics (Note 4) | | | | | | |
| Turn-on Delay Time | t _{d(on)} | V _{DD} =20V, R _L =2Ω V _{GS} =10V, R _G =3Ω | - | 6.4 | - | nS |
| Turn-on Rise Time | t _r | | - | 17.2 | - | nS |
| Turn-Off Delay Time | t _{d(off)} | | - | 29.6 | - | nS |
| Turn-Off Fall Time | t _f | | - | 16.8 | - | nS |
| Total Gate Charge | Q _g | V _{DS} =20V, I _D =6.5A, V _{GS} =10V | - | 30 | | nC |
| Gate-Source Charge | Q _{gs} | | - | 4.2 | | nC |
| Gate-Drain Charge | Q _{gd} | | - | 9.5 | | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage (Note 3) | V _{SD} | V _{GS} =0V, I _S =13A | - | | 1.0 | V |
| Diode Forward Current (Note 2) | I _S | | - | - | 13 | A |
| Reverse Recovery Time | t _{rr} | T _J = 25°C, I _F = 6.5A di/dt = 100A/μs (Note3) | - | 29 | - | nS |
| Reverse Recovery Charge | Q _{rr} | | - | 26 | - | nC |

Notes:

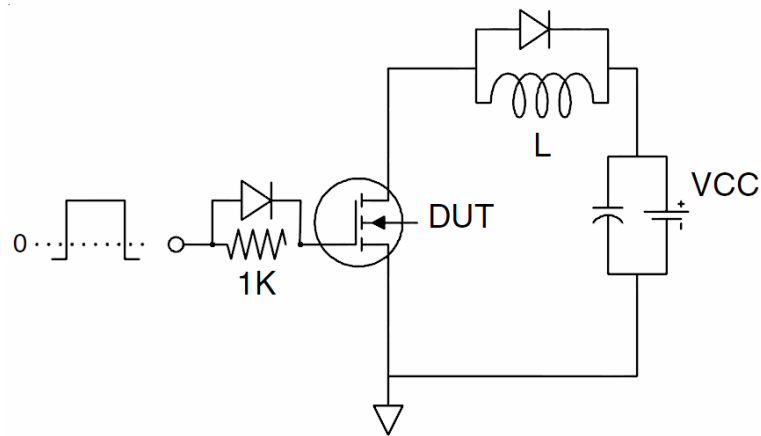
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production

Test circuit

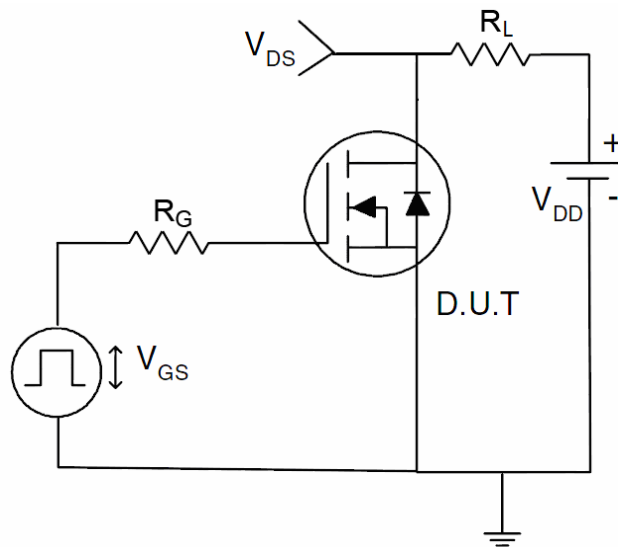
1) E_{AS} Test Circuit



2) Gate Charge Test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

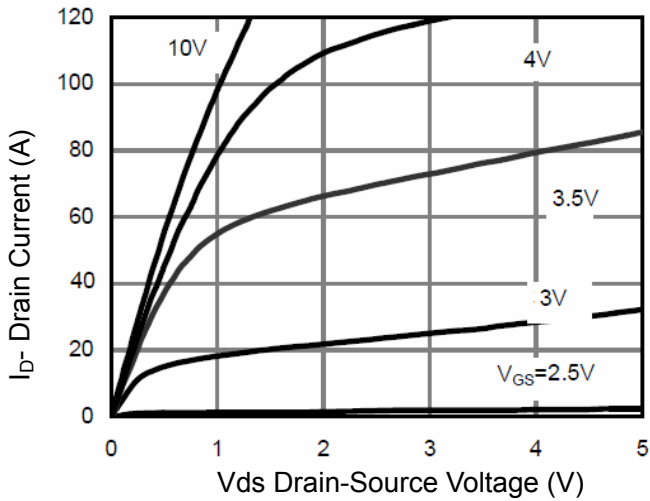


Figure 1 Output Characteristics

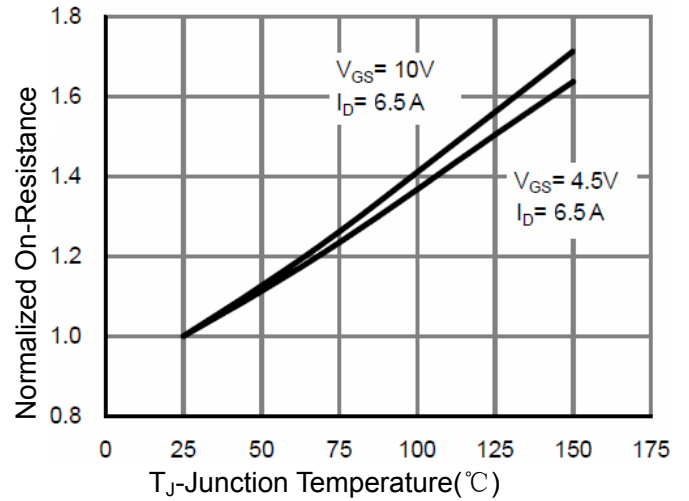


Figure 4 Rdson-Junction Temperature

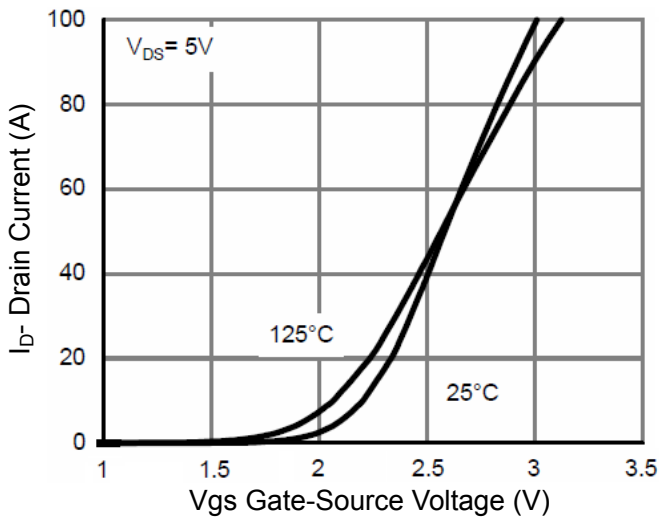


Figure 2 Transfer Characteristics

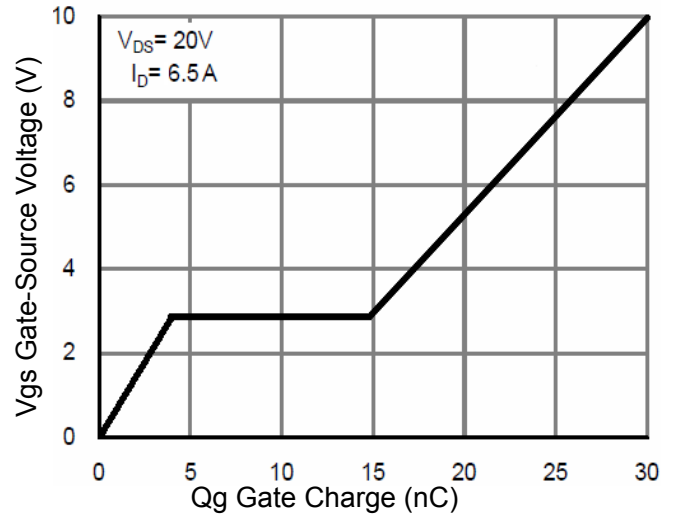


Figure 5 Gate Charge

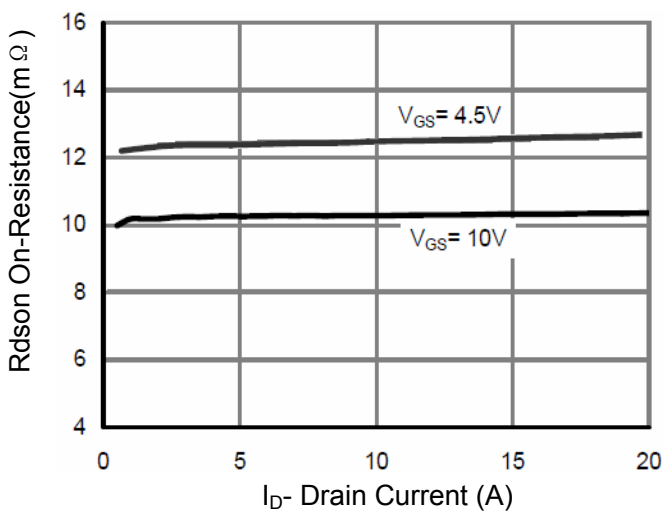


Figure 3 Rdson- Drain Current

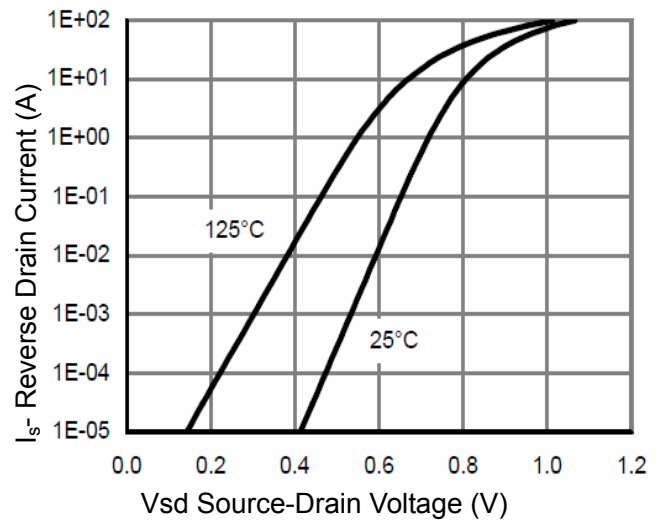


Figure 6 Source- Drain Diode Forward

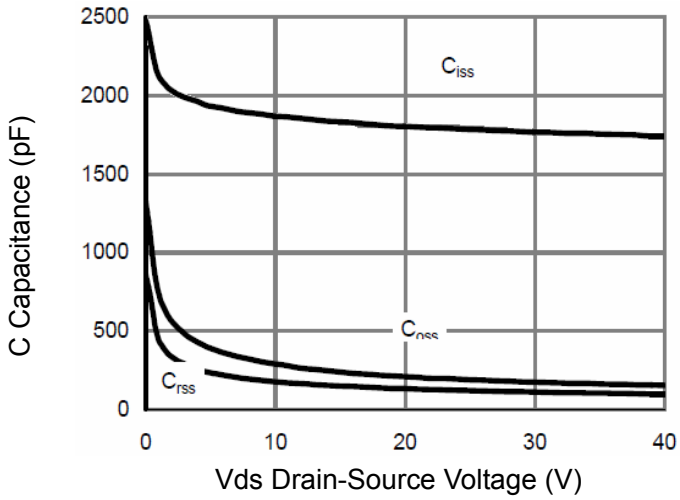


Figure 7 Capacitance vs Vds

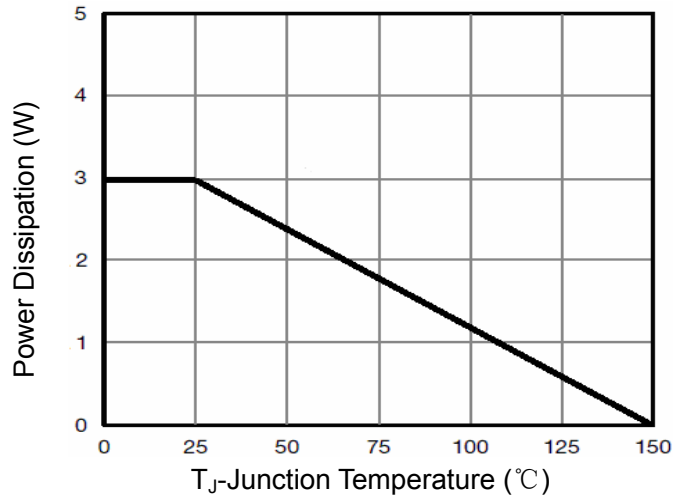


Figure 9 Power De-rating

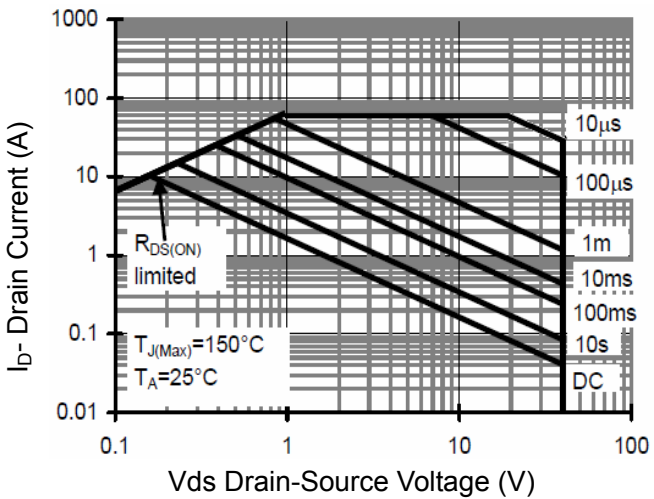


Figure 8 Safe Operation Area

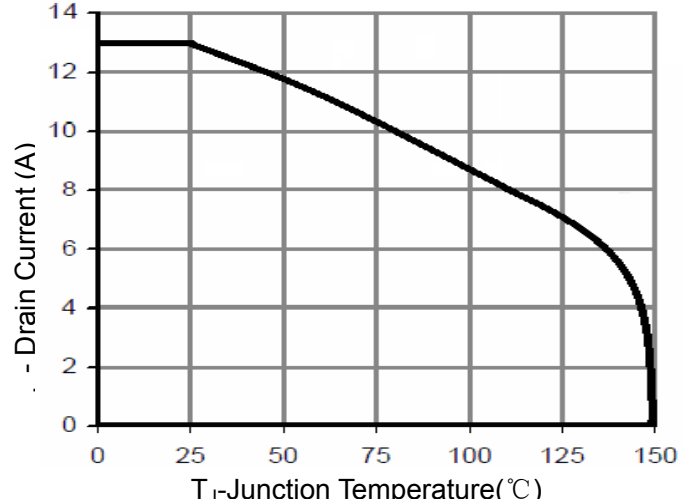


Figure 10 Current De-rating

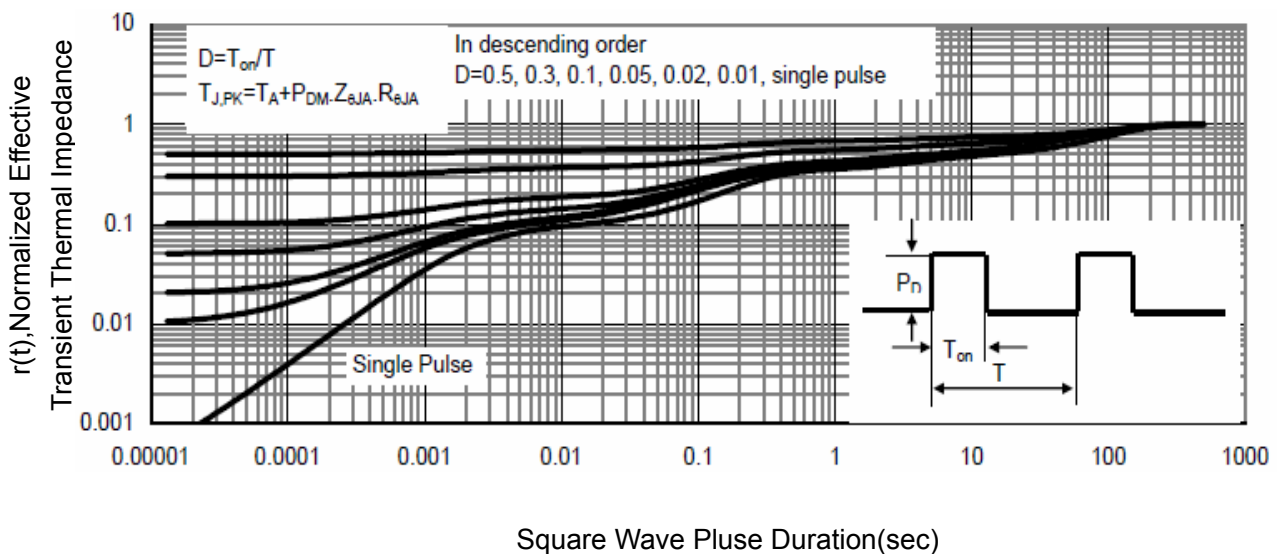


Figure 11 Normalized Maximum Transient Thermal Impedance