

GL Silicon N-Channel Power MOSFET

General Description :

The CS540A4 uses advanced trench technology and design to provide excellent RDS(ON) with low gate charge. It can be used in a wide variety of applications. The package form is TO-252, which accords with the RoHS standard.

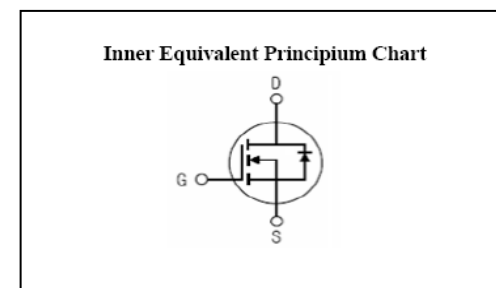
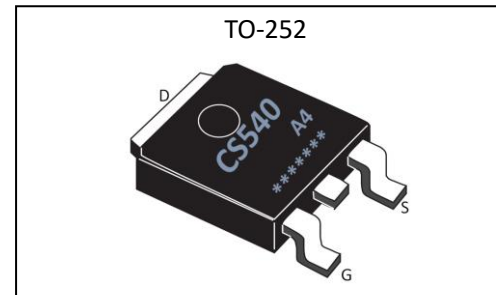
Features :

- Fast Switching
- Low Gate Charge and Rds(on)
- Low Reverse transfer capacitances
- 100% Single Pulse avalanche energy Test

Applications :

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

| | | |
|-------------------------|-----|----|
| V _{DSS} | 100 | V |
| I _D | 30 | A |
| P _D | 85 | W |
| R _{DS(ON)type} | 24 | mΩ |



Absolute (T_c= 25°C unless otherwise specified) :

| Symbol | Parameter | Rating | Units |
|-----------------------------------|--|------------------|-------|
| V _{DSS} | Drain-to-Source Voltage | 100 | V |
| I _D | Continuous Drain Current | 30 | A |
| | Continuous Drain Current T _C = 100 °C | 21 | A |
| I _{DM} | Pulsed Drain Current | 120 | A |
| V _{GS} | Gate-to-Source Voltage | ±20 | V |
| E _{AS} ^{a2} | Single Pulse Avalanche Energy | 260 | mJ |
| E _{AR} ^{a1} | Avalanche Energy ,Repetitive | 35 | mJ |
| I _{AR} ^{a1} | Avalanche Current | 8 | A |
| dv/dt ^{a3} | Peak Diode Recovery dv/dt | 5.0 | V/ns |
| P _D | Power Dissipation | 85 | W |
| T _J , T _{stg} | Operating Junction and Storage Temperature Range | 175 , -55 to 175 | °C |
| T _L | Maximum Temperature for Soldering | 300 | °C |



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Electrical Characteristics ($T_c = 25^\circ\text{C}$ unless otherwise specified) :

| OFF Characteristics | | | | | | |
|------------------------------|-----------------------------------|--|--------|------|------|---------------------|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| V_{DSS} | Drain to Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 100 | -- | -- | V |
| $\Delta BV_{DSS}/\Delta T_J$ | Bvdss Temperature Coefficient | $I_D=250\mu A, \text{Reference } 25^\circ\text{C}$ | -- | 0.1 | -- | V/ $^\circ\text{C}$ |
| I_{DSS} | Drain to Source Leakage Current | $V_{DS}=100V, V_{GS}=0V, T_a=25^\circ\text{C}$ | -- | -- | 1 | μA |
| | | $V_{DS}=80V, V_{GS}=0V, T_a=125^\circ\text{C}$ | -- | -- | 250 | |
| $I_{GSS(F)}$ | Gate to Source Forward Leakage | $V_{GS}=+20V$ | -- | -- | 1 | μA |
| $I_{GSS(R)}$ | Gate to Source Reverse Leakage | $V_{GS}=-20V$ | -- | -- | -1 | μA |

| ON Characteristics | | | | | | |
|--|-------------------------------|-----------------------------------|--------|------|------|------------|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| $R_{DS(ON)}$ | Drain-to-Source On-Resistance | $V_{GS}=10V, I_D=10A$ | -- | 24 | 30 | m Ω |
| $V_{GS(TH)}$ | Gate Threshold Voltage | $V_{DS} = V_{GS}, I_D = 250\mu A$ | 1.0 | -- | 3.0 | V |
| Pulse width $t_p \leq 380\mu s, \delta \leq 2\%$ | | | | | | |

| Dynamic Characteristics | | | | | | |
|-------------------------|------------------------------|--|--------|------|------|-------|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| g_{fs} | Forward Transconductance | $V_{DS}=5V, I_D=10.0A$ | 8.0 | -- | -- | S |
| C_{iss} | Input Capacitance | $V_{GS}=0V, V_{DS}=50V$ $f=1.0\text{MHz}$ | -- | 2000 | -- | pF |
| C_{oss} | Output Capacitance | | -- | 300 | -- | |
| C_{riss} | Reverse Transfer Capacitance | | -- | 250 | -- | |

| Resistive Switching Characteristics | | | | | | |
|-------------------------------------|-----------------------------------|--|--------|------|------|-------|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| $t_{d(ON)}$ | Turn-on Delay Time | $I_D=15A, V_{DD}=50V$ $V_{GS}=10V, R_G=3.0\Omega$ | -- | 10 | -- | ns |
| t_r | Rise Time | | -- | 10 | -- | |
| $t_{d(OFF)}$ | Turn-Off Delay Time | | -- | 38 | -- | |
| t_f | Fall Time | | -- | 14 | -- | |
| Q_g | Total Gate Charge | $I_D=15A, V_{DD}=50V$ $V_{GS}=10V$ | -- | 45 | -- | nC |
| Q_{gs} | Gate to Source Charge | | -- | 12 | -- | |
| Q_{gd} | Gate to Drain ("Miller") Charge | | -- | 18 | -- | |

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Source-Drain Diode Characteristics

| Symbol | Parameter | Test Conditions | Rating | | | Units |
|----------|--|------------------------------|--------|------|------|-------|
| | | | Min. | Typ. | Max. | |
| I_S | Continuous Source Current (Body Diode) | | -- | -- | 30 | A |
| I_{SM} | Maximum Pulsed Current (Body Diode) | | -- | -- | 120 | A |
| V_{SD} | Diode Forward Voltage | $I_S=30A, V_{GS}=0V$ | -- | -- | 1.5 | V |
| t_{rr} | Reverse Recovery Time | $I_S=30A, T_j = 25^\circ C$ | -- | 66 | -- | ns |
| Q_{rr} | Reverse Recovery Charge | $di_F/dt=100A/us, V_{GS}=0V$ | -- | 130 | -- | nC |

Pulse width $t_p \leq 380\mu s, \delta \leq 2\%$

| Symbol | Parameter | Typ. | Units |
|-----------------|------------------|------|--------------|
| $R_{\theta JC}$ | Junction-to-Case | 1.8 | $^\circ C/W$ |

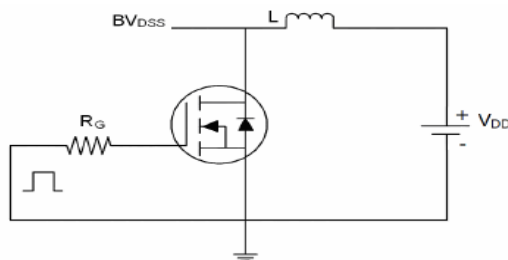
^{a1} : Repetitive rating; pulse width limited by maximum junction temperature

^{a2} : EAS condition : $T_j=25^\circ C, V_{DD}=40V, V_G=10V, L=0.5mH, R_g=25\Omega$

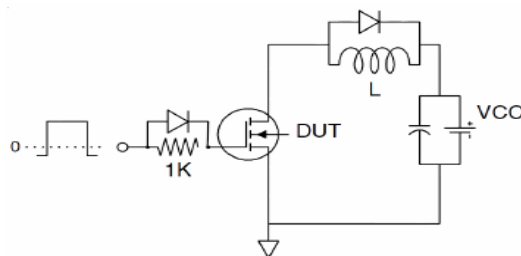
^{a3} : $I_{SD}=30A, di/dt \leq 100A/us, V_{DD} \leq BV_{DS}, \text{Start } T_j=25^\circ C$

Test Circuit

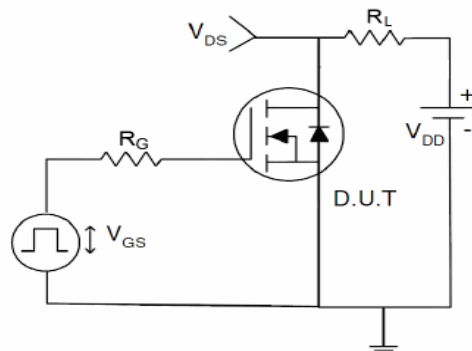
1) EAS test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



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Typical Electrical and Thermal Characteristics (Curves)

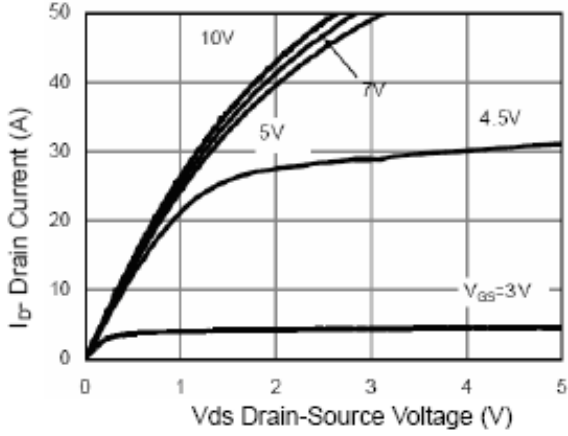


Figure 1 Output Characteristics

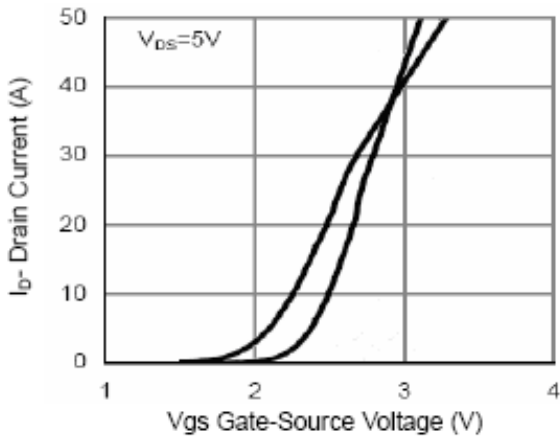


Figure 2 Transfer Characteristics

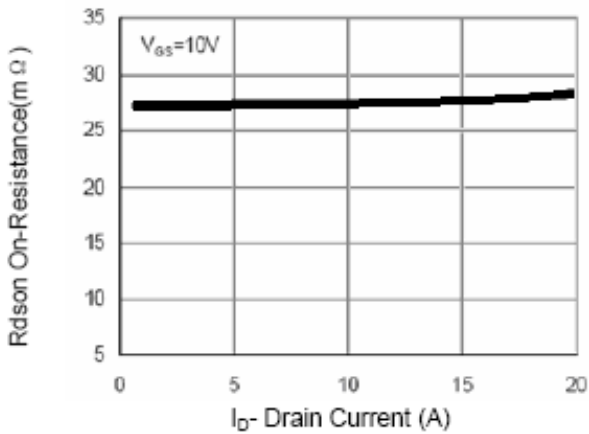


Figure 3 Rdson- Drain Current

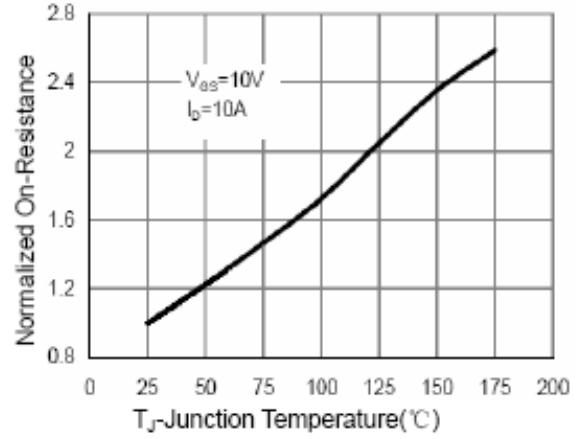


Figure 4 Rdson-Junction Temperature

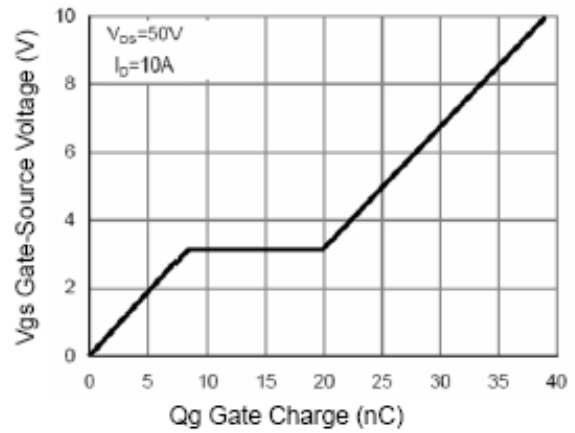


Figure 5 Gate Charge

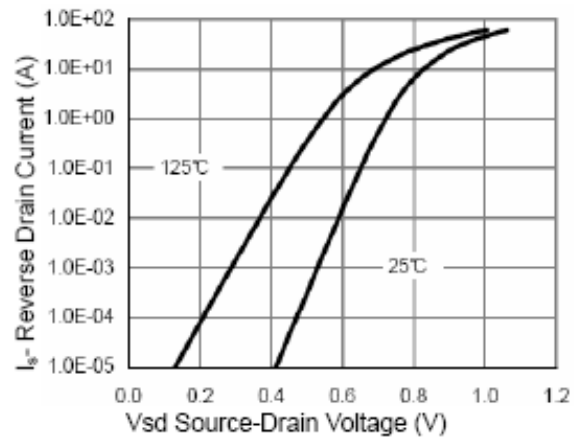


Figure 6 Source- Drain Diode Forward



CS540A4

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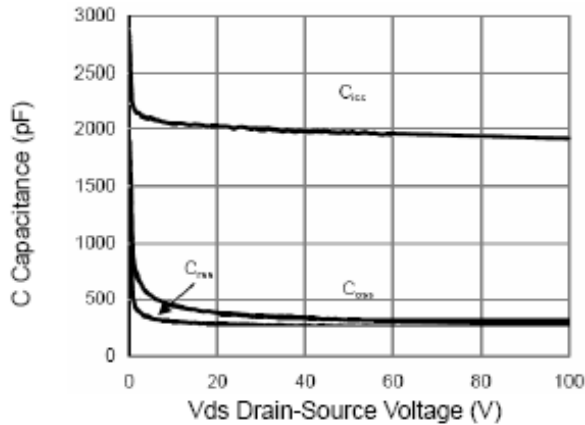


Figure 7 Capacitance vs Vds

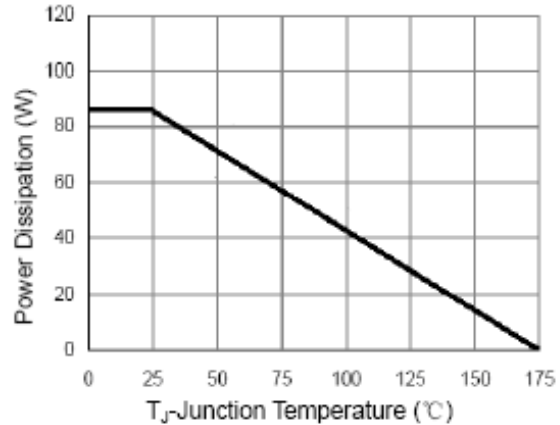


Figure 9 Power De-rating

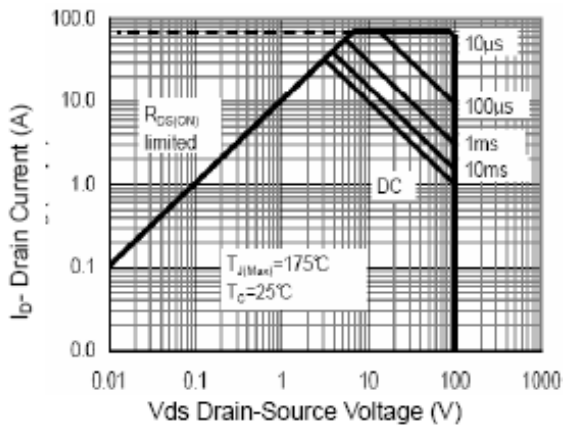


Figure 8 Safe Operation Area

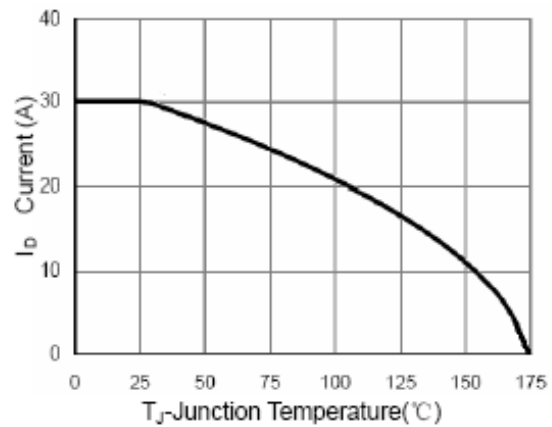


Figure 10 ID Current- Junction Temperature

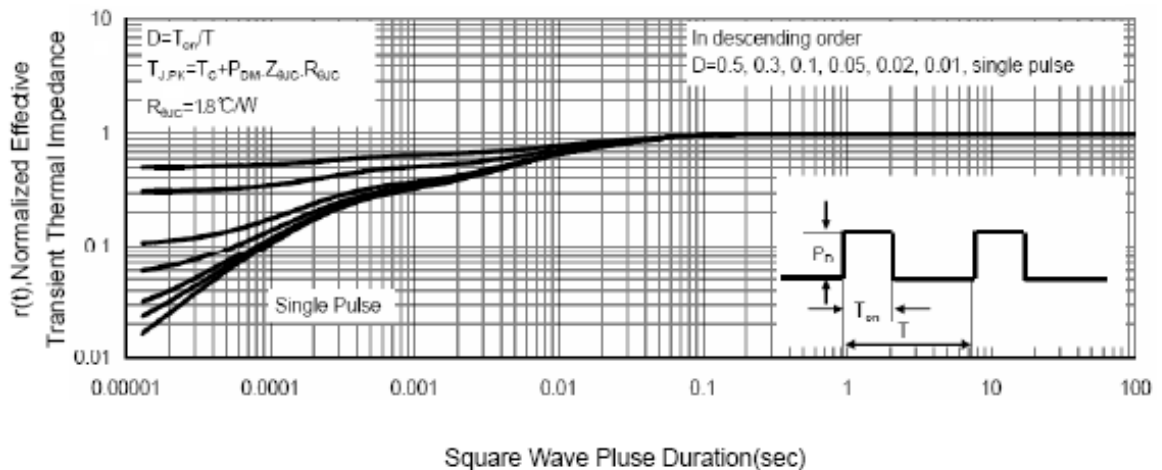


Figure 11 Normalized Maximum Transient Thermal Impedance

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