



**THE DATASHEET OF
MCG53N06A-TP**



Features

- Split Gate Trench MOSFET Technology
- High Density Cell Design For Ultra Low $R_{DS(on)}$
- Moisture Sensitivity Level 1
- Halogen Free."Green"Device^(Note1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

Maximum Ratings

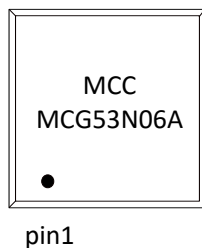
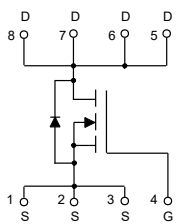
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 60°C/W Junction to Ambient^(Note2)
- Thermal Resistance: 2.8°C/W Junction to Case

| Parameter | Symbol | Rating | Unit |
|---|----------|-------------------------|------|
| Drain-Source Voltage | V_{DS} | 60 | V |
| Gate-Source Voltage | V_{GS} | ±20 | V |
| Continuous Drain Current | I_D | $T_C=25^\circ\text{C}$ | 53 |
| | | $T_C=100^\circ\text{C}$ | 33.5 |
| Pulsed Drain Current ^(Note3) | I_{DM} | 212 | A |
| Total Power Dissipation ^(Note4) | P_D | 45 | W |
| Single Pulse Avalanche Energy ^(Note 5) | E_{AS} | 162 | mJ |

Note:

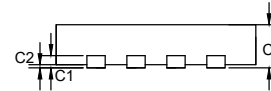
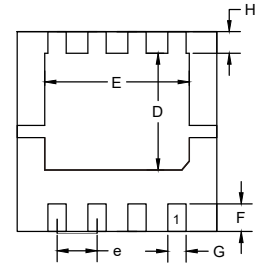
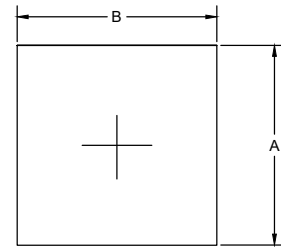
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$.
3. Repetitive rating; pulse width limited by max. junction temperature.
4. P_D is based on max. junction temperature, using junction-case thermal resistance.
5. $T_J=25^\circ\text{C}$, $V_{DD}=40\text{V}$, $R_G=25\Omega$, $V_{GS}=10\text{V}$, $L=1\text{mH}$.

Internal Structure and Marking Code



N-CHANNEL MOSFET

DFN3333



| DIM | DIMENSIONS | | | | NOTE |
|-----|------------|-------|------|------|------|
| | INCHES | | MM | | |
| | MIN | MAX | MIN | MAX | |
| A | 0.126 | 0.130 | 3.20 | 3.30 | |
| B | 0.126 | 0.130 | 3.20 | 3.30 | |
| C | 0.030 | 0.033 | 0.75 | 0.85 | |
| C1 | 0.007 | 0.009 | 0.18 | 0.22 | |
| C2 | --- | 0.002 | --- | 0.05 | |
| D | 0.071 | 0.079 | 1.80 | 2.00 | |
| E | 0.087 | 0.098 | 2.20 | 2.50 | |
| F | 0.016 | 0.020 | 0.40 | 0.50 | |
| G | 0.010 | 0.014 | 0.25 | 0.35 | |
| H | 0.012 | 0.016 | 0.30 | 0.40 | |
| e | 0.024 | 0.028 | 0.60 | 0.70 | |

Electrical Characteristics @ 25°C (Unless Otherwise Specified)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---------------------------------|---------------|---|-----|------|-----------|------------|
| Static Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=250\mu A$ | 60 | | | V |
| Gate-Source Leakage Current | I_{GSS} | $V_{DS}=0V, V_{GS}=\pm 20V$ | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=60V, V_{GS}=0V$ | | | 1 | μA |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 1.2 | 1.7 | 2.5 | V |
| Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}=10V, I_D=20A$ | | 5.8 | 8.2 | m Ω |
| | | $V_{GS}=4.5V, I_D=10A$ | | 7.3 | 12 | |
| Gate Resistance | R_g | $V_{DS}=0V, V_{GS}=0V, f=1MHz$ | | 1.5 | | Ω |
| Diode Characteristics | | | | | | |
| Continuous Body Diode Current | I_S | | | | 53 | A |
| Diode Forward Voltage | V_{SD} | $V_{GS}=0V, I_S=20A$ | | | 1.3 | V |
| Reverse Recovery Time | t_{rr} | $I_F=20A, di_F/dt=200A/\mu s$ | | 31 | | ns |
| Reverse Recovery Charge | Q_{rr} | | | 48 | | nC |
| Dynamic Characteristics | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}=30V, V_{GS}=0V, f=1MHz$ | | 1850 | | pF |
| Output Capacitance | C_{oss} | | | 424 | | |
| Reverse Transfer Capacitance | C_{riss} | | | 22 | | |
| Total Gate Charge | Q_g | $V_{DS}=30V, V_{GS}=10V, I_D=20A$ | | 32 | | nC |
| Gate-Source Charge | Q_{gs} | | | 4.5 | | |
| Gate-Drain Charge | Q_{gd} | | | 5.6 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}=30V, V_{GS}=10V, R_G=3\Omega, I_{DS}=12A$ | | 8.5 | | ns |
| Turn-On Rise Time | t_r | | | 5.5 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 29 | | |
| Turn-Off Fall Time | t_f | | | 8.5 | | |

Curve Characteristics

Fig.1 - Typical Output Characteristics

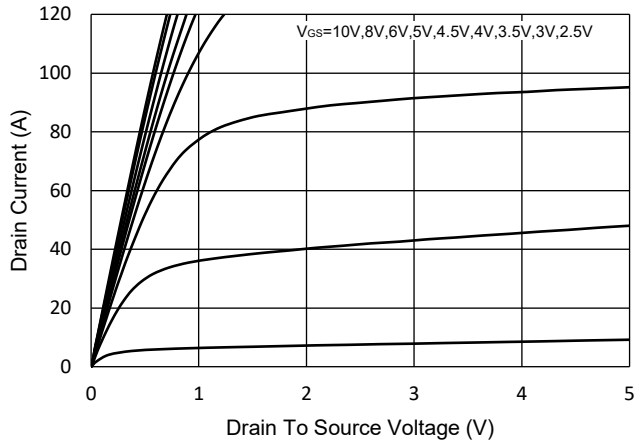


Fig.2 - Transfer Characteristic

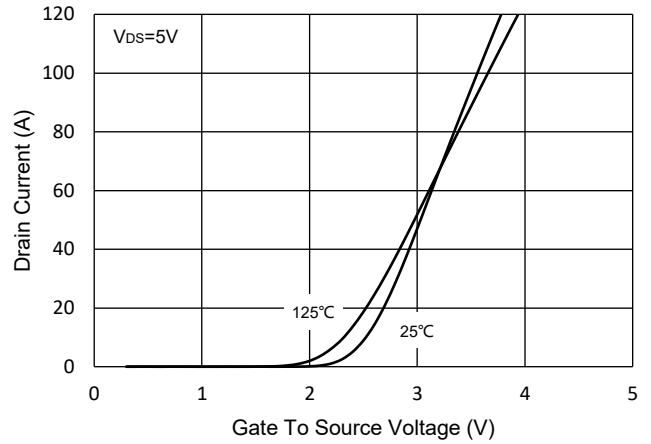


Fig.3 - $R_{DS(ON)}$ - V_{GS}

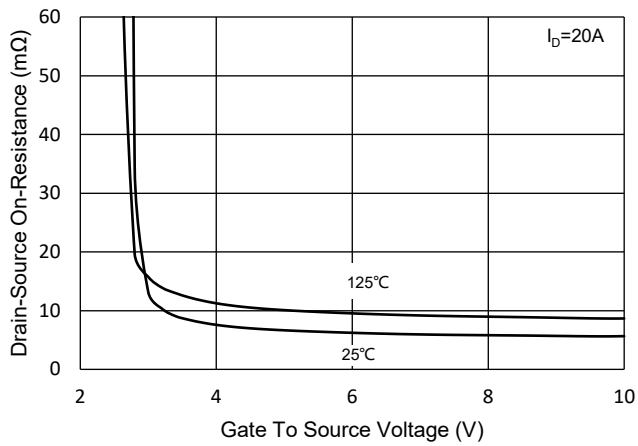


Fig.4 - $R_{DS(ON)}$ - I_D

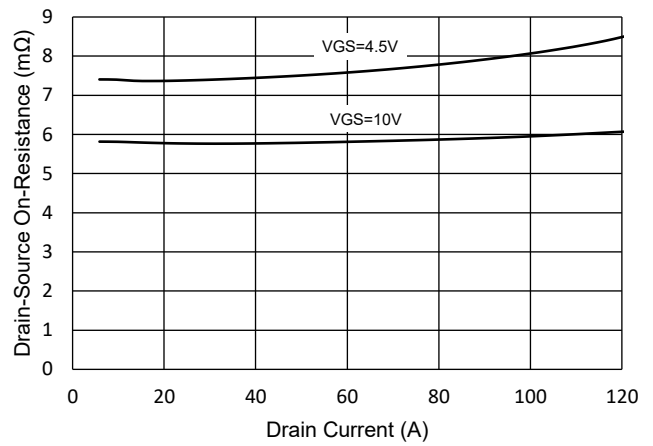


Fig.5 - Capacitance Characteristics

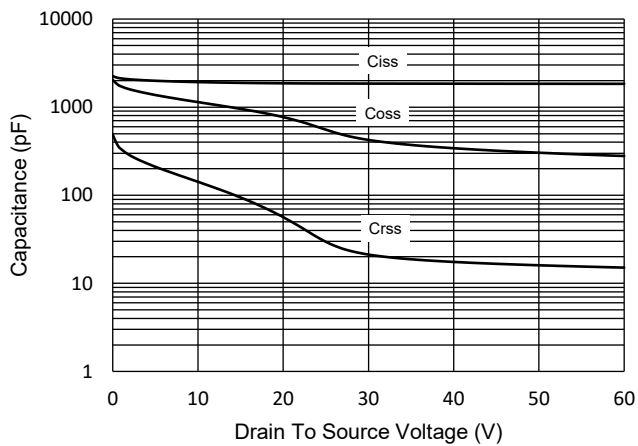
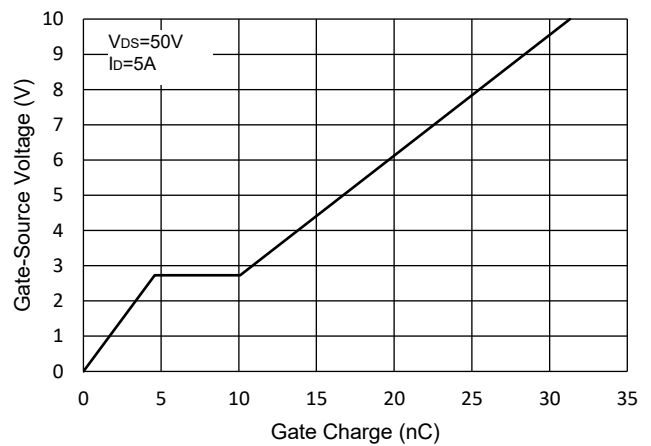


Fig.6 - Gate Charge



Curve Characteristics

Fig.7 - Normalized Threshold Voltage

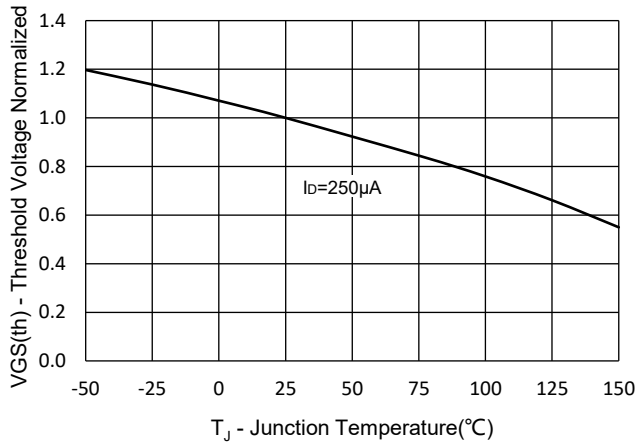


Fig.8 - Normalized On Resistance Characteristics

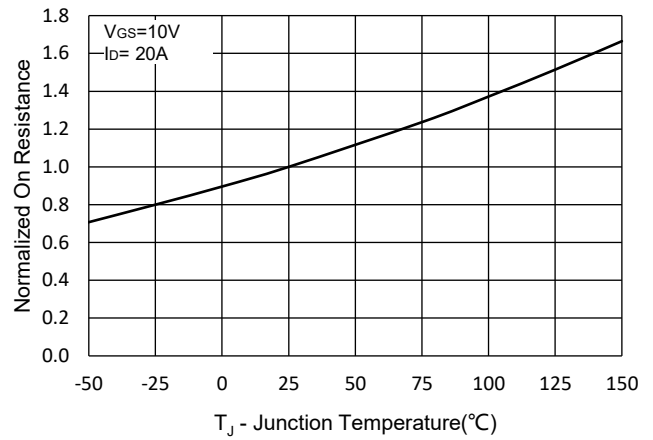


Fig.9 - I_S - V_{SD}

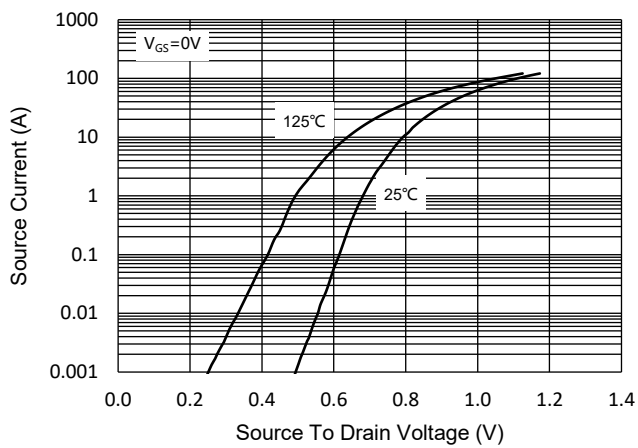


Fig.10 - Drain Current

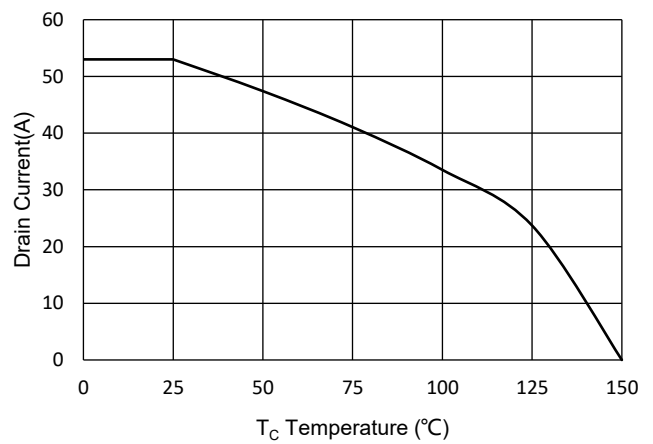
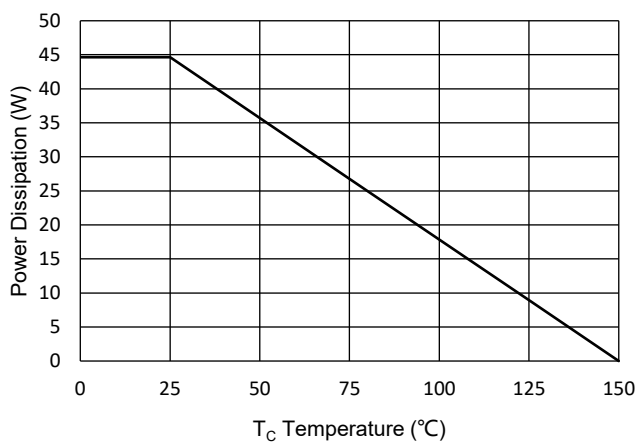


Fig.11 - PD Dissipation



Curve Characteristics

Fig.12 - Safe Operation Area

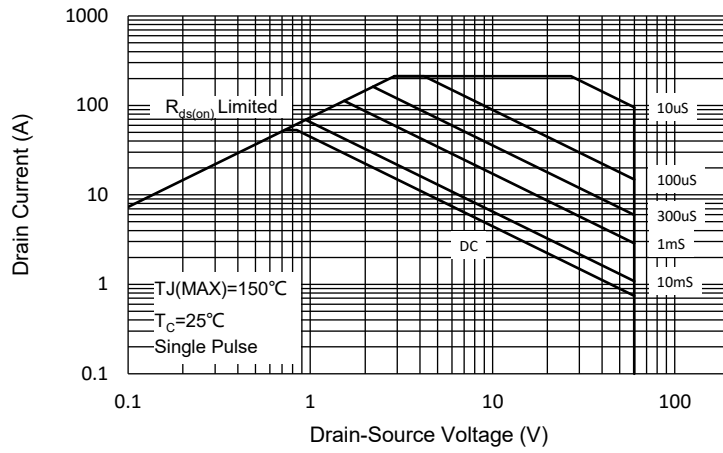
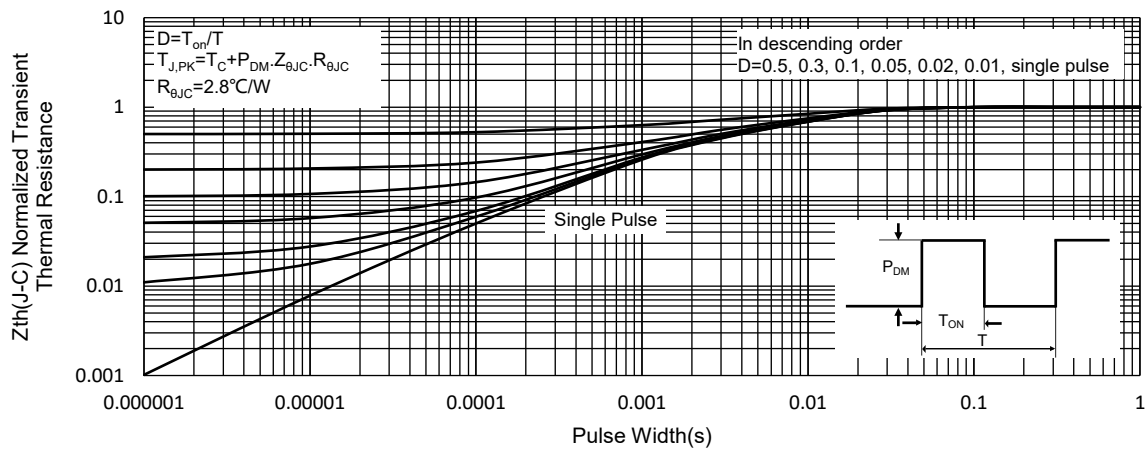


Fig.13 - Normalized Transient Thermal Impedance



Ordering Information

| Device | Packing |
|----------------|-----------------------|
| Part Number-TP | Tape&Reel: 5Kpcs/Reel |

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