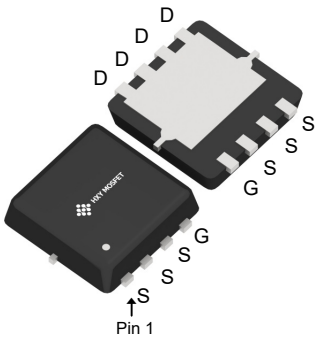
# MCG20N06HE3-TP

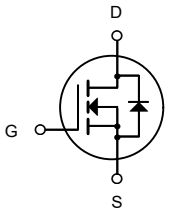
N-Channel Enhancement Mode MOSFET

## Description

The MCG20N06HE3-TP uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.




DFN3X3-8L




N-Channel MOSFET

## General Features

$V_{DS}$ = 60V $I_D$ = 20A

$R_{DS(ON)}$ < 30mΩ @ $V_{GS}$=10V

## Application

Battery protection

Load switch

Uninterruptible power supply

## Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|---|---|---|---|
| MCG20N06HE3-TP | DFN3X3-8L | HXY MOSFET | 5000 |

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

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| VDS | Drain-Source Voltage | 60 | V |
| VGS | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_C$=25°C | Continuous Drain Current, $V_{GS}$ @ 10V | 20 | A |
| $I_D$@$T_C$=100°C | Continuous Drain Current, $V_{GS}$ @ 10V | 14 | A |
| IDM | Pulsed Drain Current | 90 | A |
| EAS | Single Pulse Avalanche Energy | 42 | mJ |
| $P_D$@$T_C$=25°C | Total Power Dissipation | 33 | W |
| TSTG | Storage Temperature Range | -55 to 150 | °C |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | °C |
| RθJA | Thermal Resistance Junction-ambient | 62 | °C/W |
| RθJC | Thermal Resistance Junction-Case | 3.79 | °C/W |

## Electrical Characteristics ($T_J$=25°C, unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Sourtce Breakdown Voltage | $V_{GS}$=0V,$I_D$=250μA | 60 | --- | --- | V |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{GS}$=0V, $V_{DS}$=60V | --- | --- | 1 | μA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±20V, $V_{DS}$=0A | --- | --- | ±100 | nA |
| $V_{GS(th)}$ | GATE-Source Threshold Voltage | $V_{GS}$=$V_{DS}$, $I_D$=250μA | 1.2 | 1.8 | 2.5 | V |
| $R_{DS(ON)}$ | Drain-Source On Resistance[3] | $V_{GS}$=10V,$I_D$=20A | --- | 24 | 30 | mΩ |
| | | $V_{GS}$=4.5V,$I_D$=20A | --- | 31 | 40 | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=30V, $V_{GS}$=0V, f=1MHz | --- | 1060 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 64 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 54 | --- | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD}$=30V , $V_{GS}$=10V , $I_D$=20A,$R_G$ = 3Ω | --- | 8.4 | --- | ns |
| $t_r$ | Rise Time | | --- | 8.5 | --- | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | --- | 36 | --- | ns |
| $t_f$ | Fall Time | | --- | 5 | --- | ns |
| $Q_g$ | Total Gate Charge | $V_{DS}$=30V , $V_{GS}$=10V , $I_D$=20A | --- | 26 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 5.7 | --- | nC |
| $Q_{gd}$ | Gate-Drain “Miller” Charge | | --- | 5.2 | --- | nC |
| $I_S$ | Continuous Source Current | VG=VD=0V | --- | --- | 20 | A |
| $I_{SM}$ | Pulsed Source Current | VG=VD=0V | --- | --- | 90 | A |
| $V_{SD}$ | Forward on voltage | $I_S$=20A,$V_{GS}$=0V | --- | --- | 1.2 | V |
| Trr | Body Diode Reverse Recovery Time | IF=20A, dI/dt=100A/μs | --- | 18 | --- | nS |
| Qrr | Body Diode Reverse Recovery Charge | | --- | 13 | --- | nC |

## Notes:

1) L=0.5mH, VDD=30V, Start $T_J$=25°C.

2) Limited by maximum junction temperature.

3) Repetitive Rating: Pulse width limited by maximum junction temperature

## Typical Characteristics

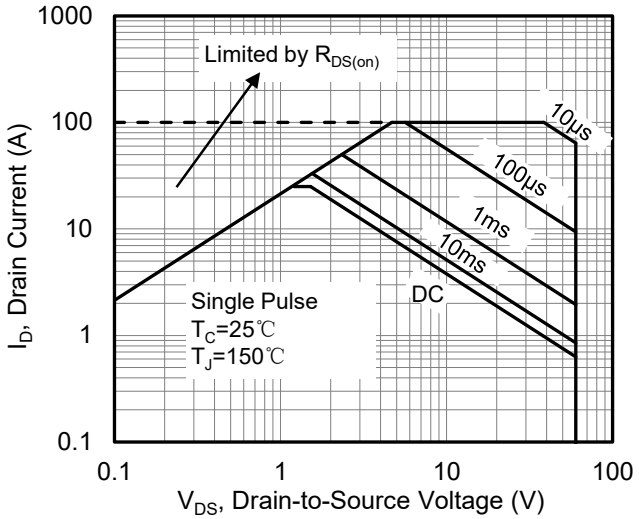



**Figure 1. Maximum Safe Operating Area**

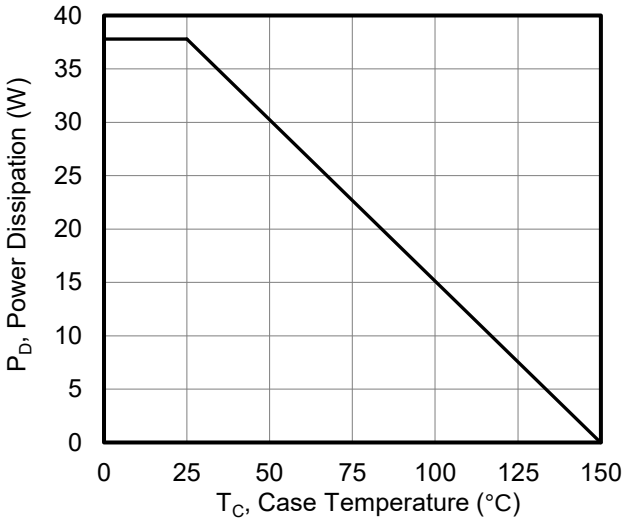



**Figure 2. Maximum Power Dissipation vs Case Temperature**

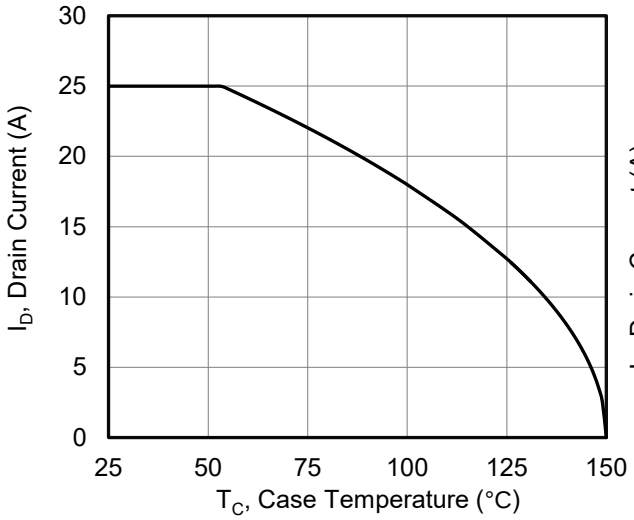



**Figure 3. Maximum Continuous Drain Current vs Case Temperature**

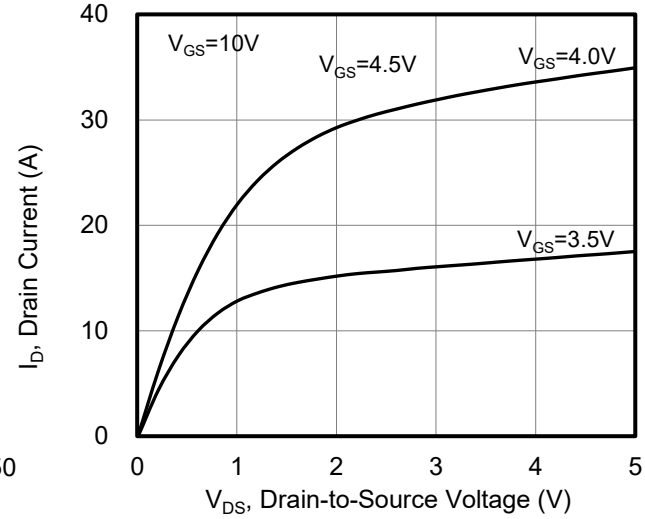



**Figure 4. Typical output Characteristics**

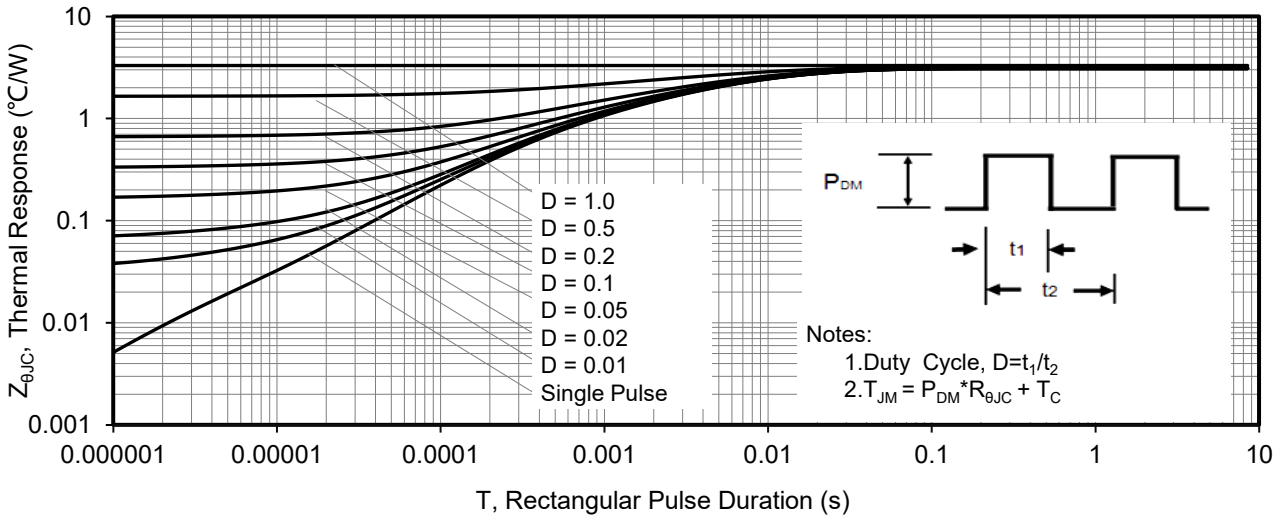



**Figure 5. Maximum Effective Thermal Impedance, Junction to Case**

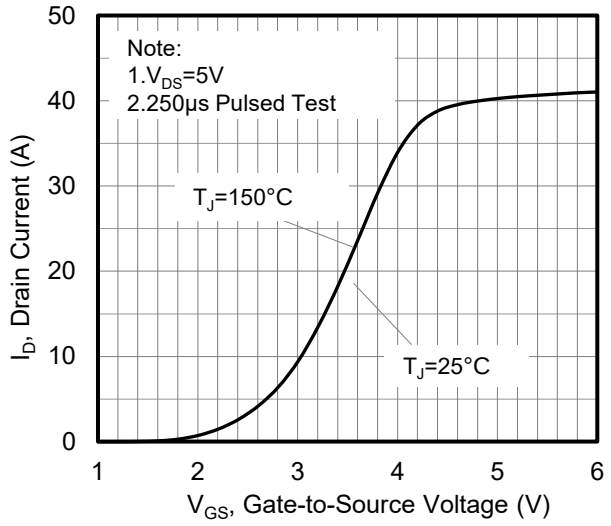



**Figure 6. Typical Transfer Characteristics**

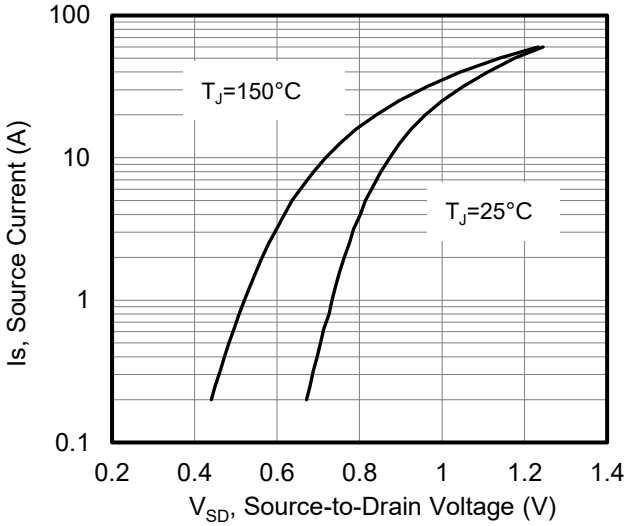



**Figure 7. Typical Body Diode Transfer Characteristics**

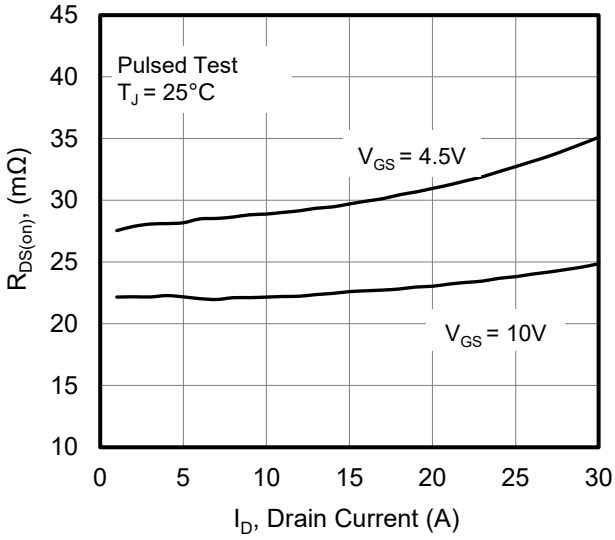



**Figure 8. Drain-to-Source On Resistance vs Drain Current**

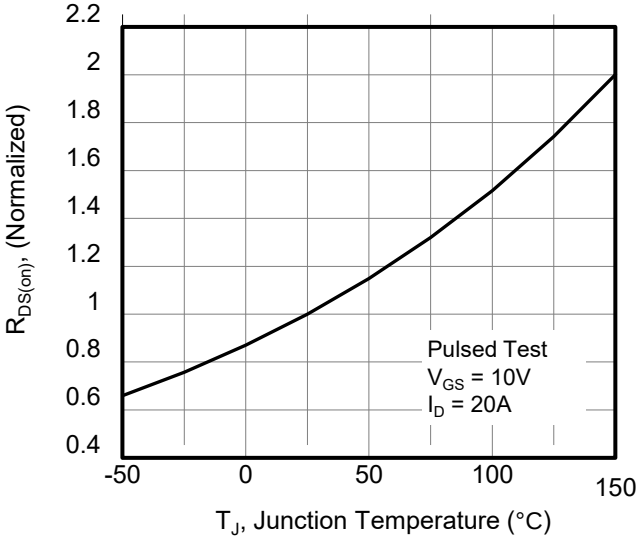



**Figure 9. Normalized On Resistance vs Junction Temperature**

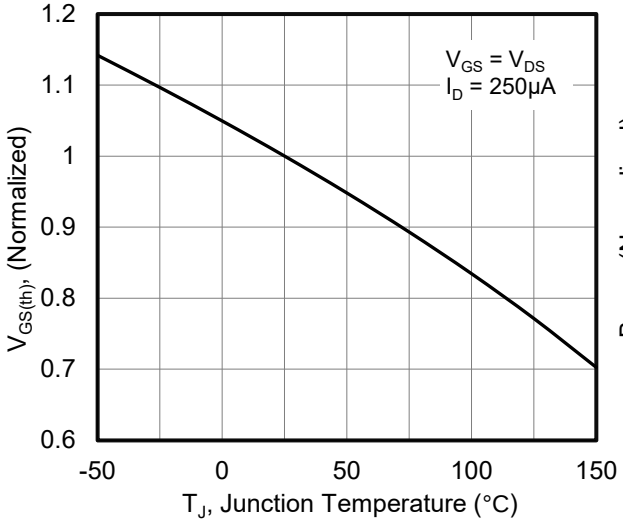



**Figure 10. Normalized Threshold Voltage vs Junction Temperature**

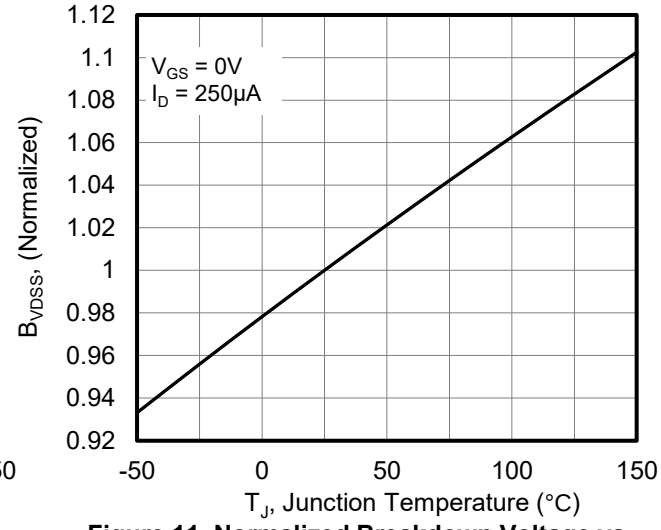



**Figure 11. Normalized Breakdown Voltage vs Junction Temperature**

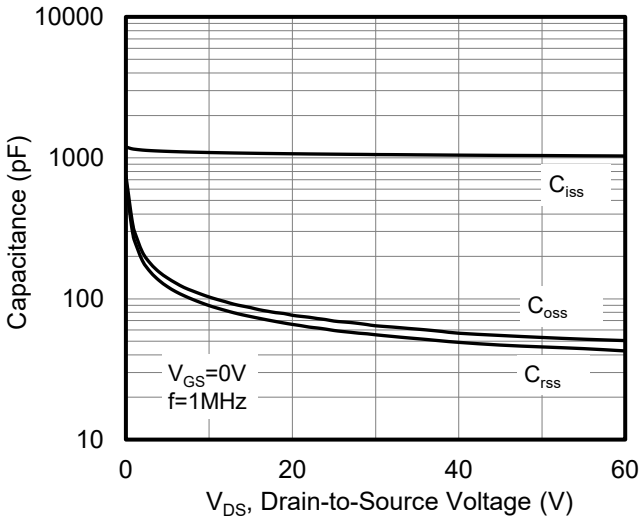



**Figure 12. Capacitance Characteristics**

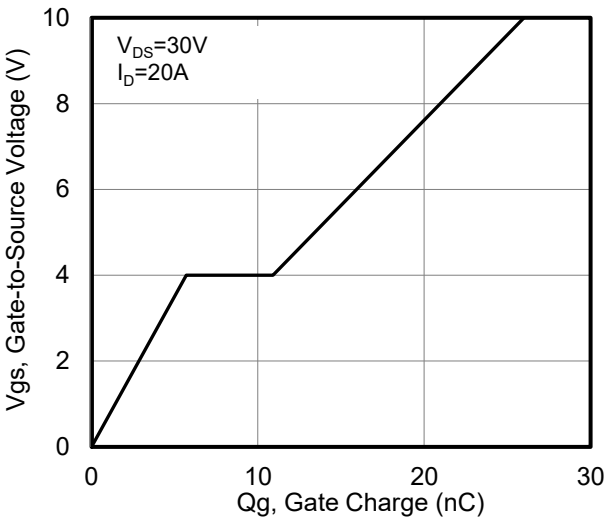
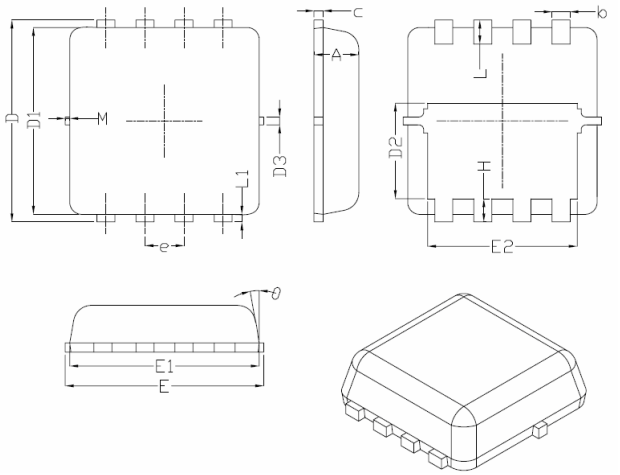



**Figure 13. Typical Gate Charge vs Gate to Source Voltage**

## DFN3X3-8L Package Information




| Symbol | Dimensions In Millimeters | | |
|---|---|---|---|
| | Min. | Nom. | Max. |
| A | 0.70 | 0.75 | 0.80 |
| b | 0.25 | 0.30 | 0.35 |
| c | 0.10 | 0.15 | 0.25 |
| D | 3.25 | 3.35 | 3.45 |
| D1 | 3.00 | 3.10 | 3.20 |
| D2 | 1.48 | 1.58 | 1.68 |
| D3 | - | 0.13 | - |
| E | 3.20 | 3.30 | 3.40 |
| E1 | 3.00 | 3.15 | 3.20 |
| E2 | 2.39 | 2.49 | 2.59 |
| e | 0.65BSC | | |
| H | 0.30 | 0.39 | 0.50 |
| L | 0.30 | 0.40 | 0.50 |
| L1 | - | 0.13 | - |
| M | * | * | 0.15 |
| θ | | 10° | 12° |

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