## 250V N-Ch Power MOSFET

| $V_{DS}$ | | 250 | V |
|---|---|---|---|
| $R_{DS(on),typ}$ | $V_{GS}$=10V | 180 | mΩ |
| $R_{DS(on),typ}$ | $V_{GS}$=4.5V | 190 | mΩ |
| $I_{D\ (Sillicon\ Limited)}$ | | 8.82 | A |

| Part Number | Package | Marking |
|---|---|---|
| HGD2K4N25ML | TO-252 | GD2K4N25ML |
| HGI2K4N25ML | TO-251 | GI2K4N25ML |
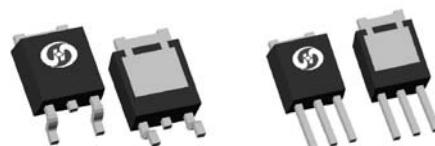
Pin2

Gate

Pin3

**Absolute Maximum Ratings at $T_J$=25    (unless otherwise specified)**

| Parameter | Symbol | Conditions | Value | Unit |
|---|---|---|---|---|
| Continuous Drain Current (Silicon Limited) | $I_D$ | $T_C$=25 | 12.5 | A |
| | | $T_C$=100 | 8.8 | |
| Drain to Source Voltage | $V_{DS}$ | - | 250 | V |
| Gate to Source Voltage | $V_{GS}$ | - | ±20 | V |
| Pulsed Drain Current | $I_{DM}$ | - | 18 | A |
| Avalanche Energy, Single Pulse | $E_{AS}$ | L=0.4mH, $T_C$=25 | 1.8 | mJ |
| Power Dissipation | $P_D$ | $T_C$=25 | 83 | W |
| Operating and Storage Temperature | $T_J$, $T_{stg}$ | - | -55 to175 | |

**Absolute Maximum Ratings**

| Parameter | Symbol | Max | Unit |
|---|---|---|---|
| Thermal Resistance Junction-Case | $R_{JC}$ | 1.8 | /W |
| Thermal Resistance Junction-Ambient | $R_{JA}$ | 65 | /W |

## Electrical Characteristics at $T_J$=25 (unless otherwise specified)

### Static Characteristics

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|---|---|---|---|---|---|---|
| Drain to Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$=0V, $I_D$=250μA | 250 | - | - | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{GS}$=$V_{DS}$, $I_D$=250μA | 1 | 2.1 | 3 | |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{GS}$=0V, $V_{DS}$=250V, $T_j$=25 | - | - | 1 | μA |
| | | $V_{GS}$=0V, $V_{DS}$=250V, $T_j$=100 | - | - | 100 | |
| Gate to Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±20V, $V_{DS}$=0V | - | - | ±100 | nA |
| Drain to Source on Resistance | $R_{DS(on)}$ | $V_{GS}$=10V, $I_D$=3A | - | 180 | 240 | mΩ |
| | $R_{DS(on)}$ | $V_{GS}$=4.5V, $I_D$=2A | - | 190 | 280 | mΩ |
| Transconductance | $g_{fs}$ | $V_{DS}$=5V, $I_D$=20A | - | 11 | - | S |
| Gate Resistance | $R_G$ | $V_{GS}$=0V, $V_{DS}$ Open, f=1MHz | - | 5.3 | - | Ω |

### Dynamic Characteristics

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|---|---|---|---|---|---|---|
| Input Capacitance | $C_{iss}$ | $V_{GS}$=0V, $V_{DS}$=125V, f=1MHz | - | 490 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 12 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 4.2 | - | |
| Total Gate Charge | $Q_g$ (10V) | $V_{DD}$=125V, $I_D$=3A, $V_{GS}$=10V | - | 10 | - | nC |
| Total Gate Charge | $Q_g$ (4.5V) | | - | 6 | - | |
| Gate to Source Charge | $Q_{gs}$ | | - | 1.6 | - | |
| Gate to Drain (Miller) Charge | $Q_{gd}$ | | - | 3.6 | - | |
| Turn on Delay Time | $t_{d(on)}$ | $V_{DD}$=125V, $I_D$=3A, $V_{GS}$=10V, $R_G$=10Ω, | - | 10 | - | ns |
| Rise time | $t_r$ | | - | 6 | - | |
| Turn off Delay Time | $t_{d(off)}$ | | - | 15 | - | |
| Fall Time | $t_f$ | | - | 5 | - | |

### Reverse Diode Characteristics

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|---|---|---|---|---|---|---|
| Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V, $I_F$=20A | - | 0.9 | 1.2 | V |
| Reverse Recovery Time | $t_{rr}$ | $V_R$=125V, $I_F$=3A, $dI_F/dt$=100A/μs | - | 40 | - | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | - | 82 | - | nC |

Hunteck

Fig 1. Typical Output Characteristics
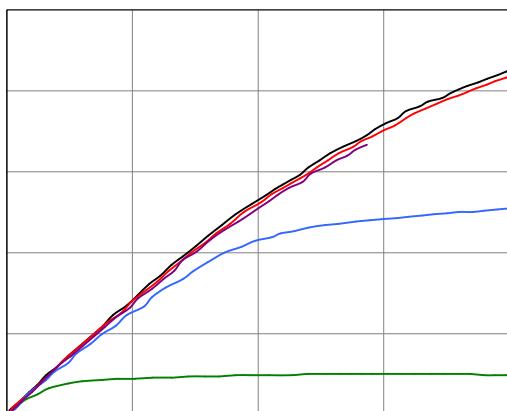
Figure 2. On-Resistance vs. Gate-Source Voltage

$R_{DS(ON)}$ ($\Omega$)

125 C

25 C

$V_{GS}$ (V)
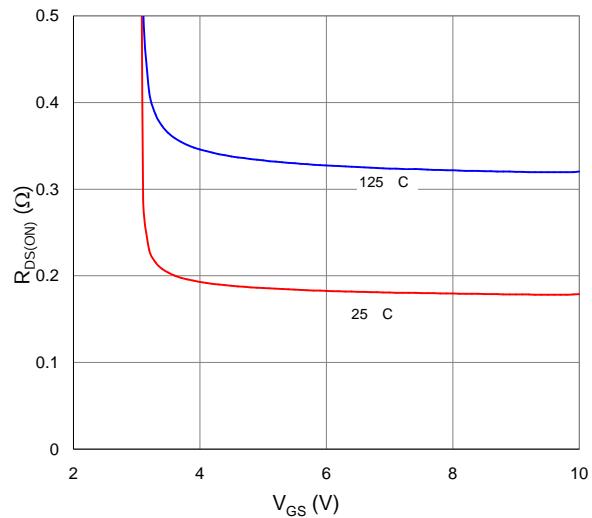
Figure 3. On-Resistance vs. Drain Current and Gate Voltage

$R_{DS(ON)}$ ($\Omega$)

$V_{GS}$=4.5V

$V_{GS}$=10V

$I_D$ (A)
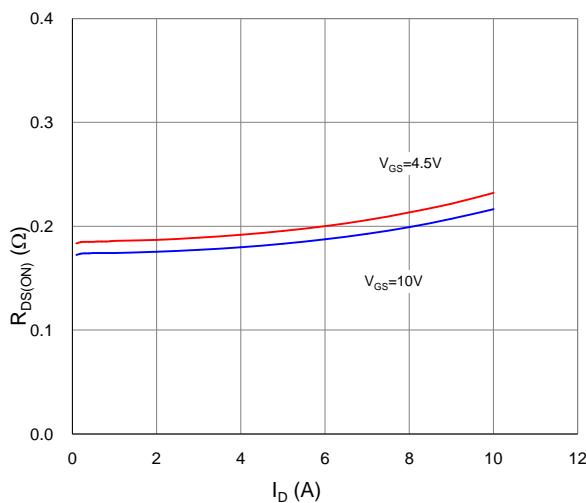
Figure 4. Normalized On-Resistance vs. Junction Temperature

Normalized On-Resistance

$I_D$=3A

$V_{GS}$=10V

$V_{GS}$=4.5V

Temperature (°C)
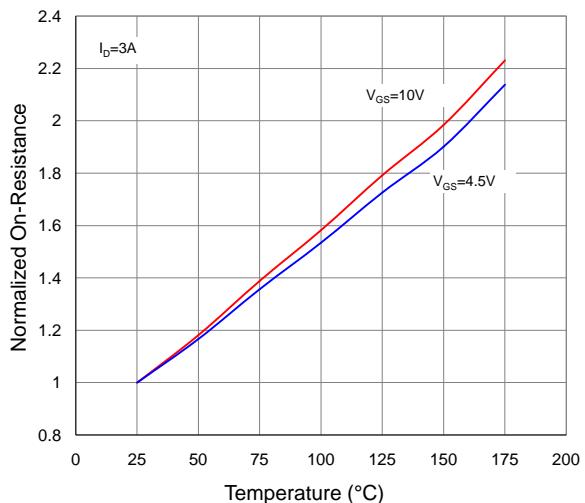
Figure 5. Typical Transfer Characteristics

$I_D$(A)

$V_{DS}$=5V

125

25

$V_{GS}$(V)
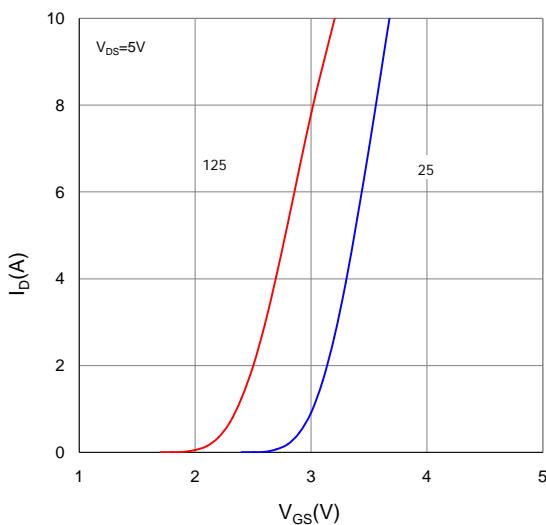
Figure 6. Typical Source-Drain Diode Forward Voltage

$I_S$ (A)

125 C

25 C

$V_{SD}$ (V)

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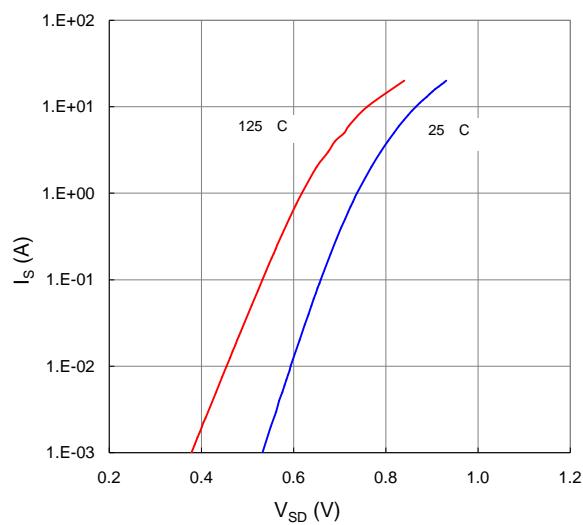
| Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage | Figure 8. Typical Capacitance vs. Drain-to-Source Voltage |
|---|---|

Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

$V_{DS}=125V$
$I_D=3A$

$V_{GS}$ (V)

$Q_g$ (nC)

Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

Capacitance (pF)

$C_{iss}$

$C_{oss}$

$C_{rss}$

$V_{DS}$ (V)
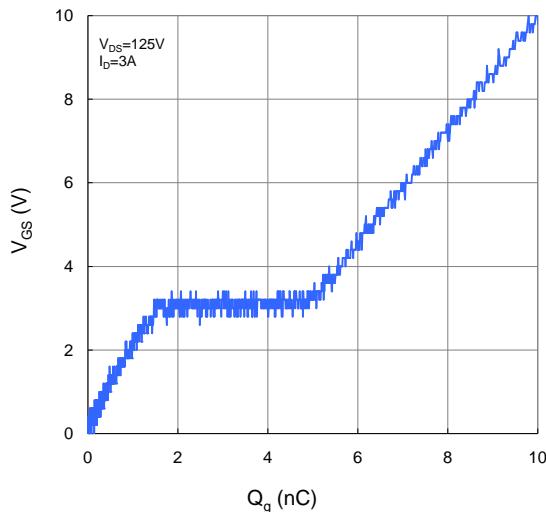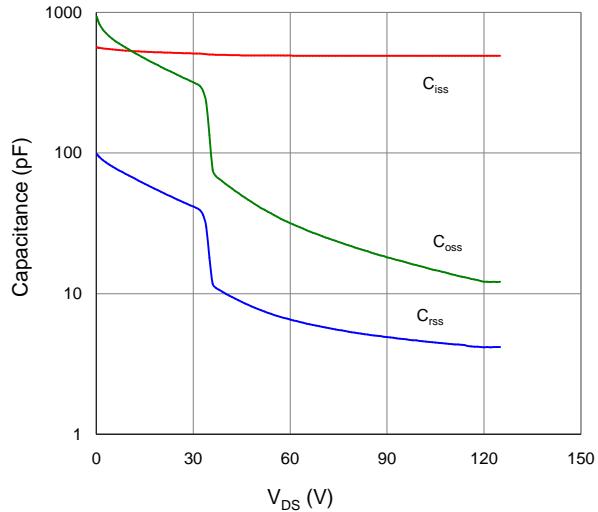
| Figure 9. Maximum Safe Operating Area | Figure 10. Maximun Drain Current vs. Case Temperature |
|---|---|
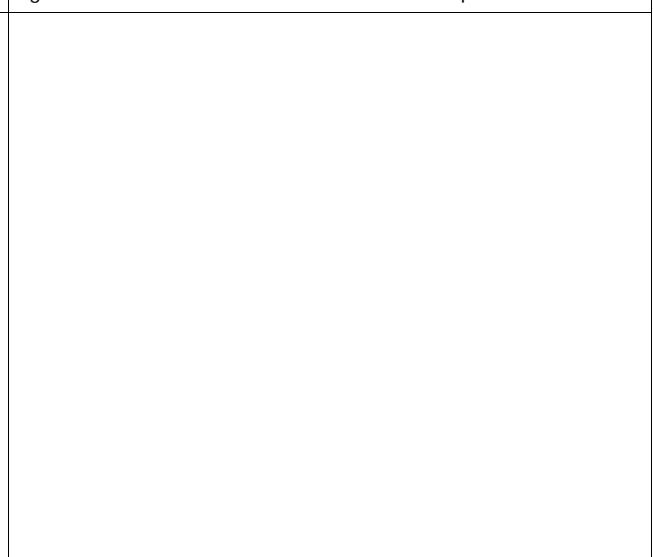
Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Case

| Inductive switching Test | |
|---|---|
| | |

| Gate Charge Test | |
|---|---|
| | |

| Uclamped Inductive Switching (UIS) Test | |
|---|---|
| | |

| Diode Recovery Test | |
|---|---|
| | |
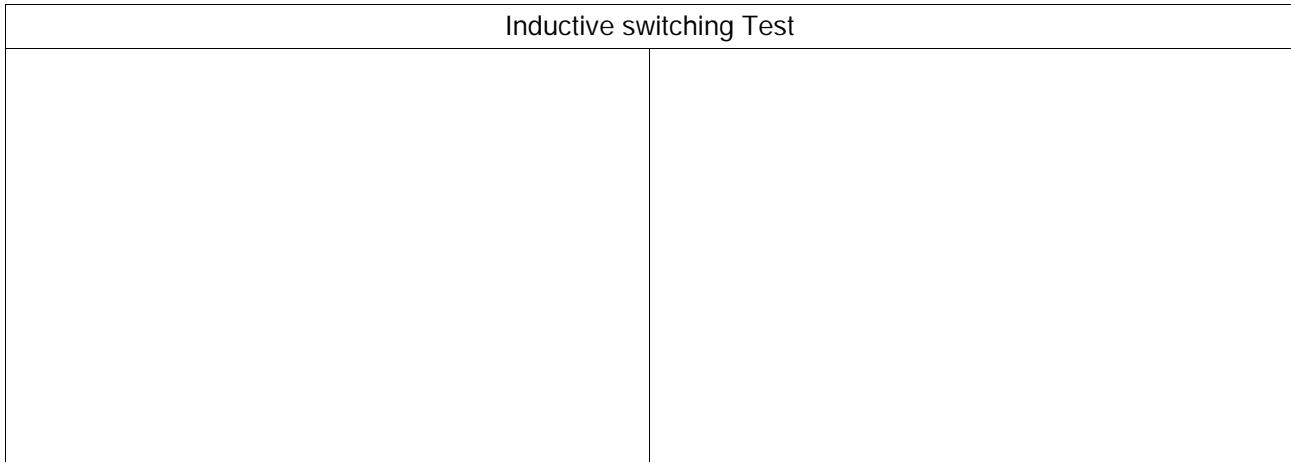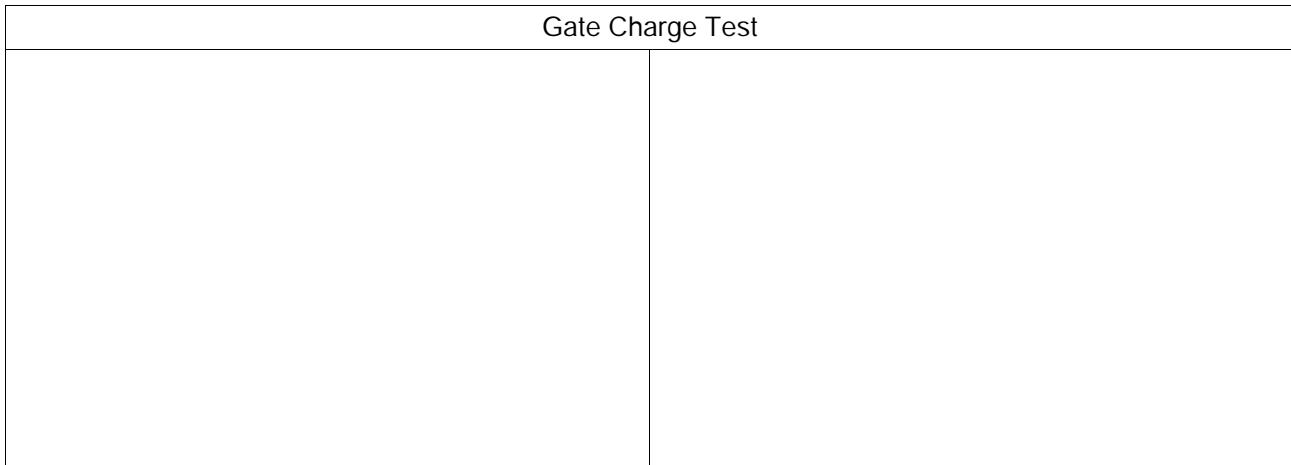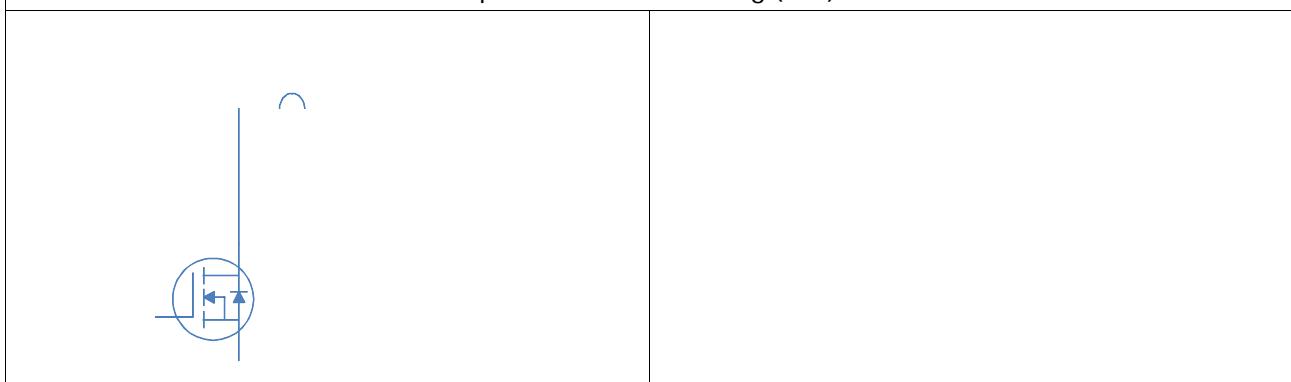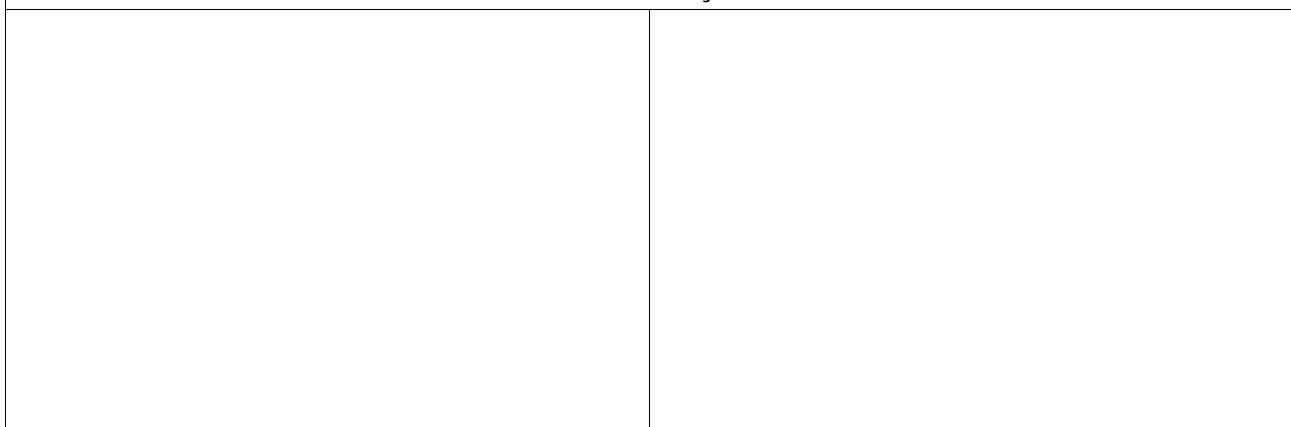
## TO-251, 3 leads
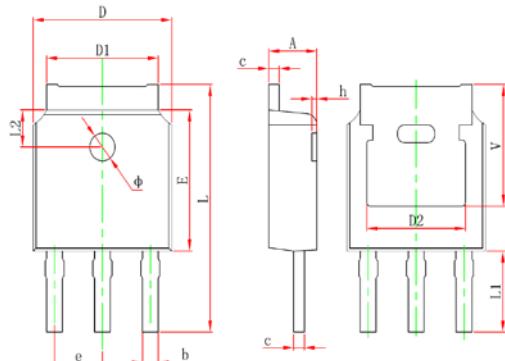


| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|------|------|------|------|
|        | Min. | Max. | Min. | Max. |
| A      | 2.200 | 2.400 | 0.087 | 0.094 |
| b      | 0.660 | 0.860 | 0.026 | 0.034 |
| c      | 0.460 | 0.580 | 0.018 | 0.023 |
| D      | 6.500 | 6.700 | 0.256 | |

## TO-252, 2 leads



| | Dimensions In Millimeters | | Dimensions In Inches | | Symbol |
|--|------|------|------|------|--------|
| | Min. | Max. | Min. | Max. | |
| | 2.200 | 2.400 | 0.087 | 0.094 | A |
| | 0.000 | 0.127 | 0.000 | 0.005 | A1 |
| | 0.660 | 0.860 | 0.026 | 0.034 | b |
| | 0.460 | 0.580 | 0.018 | 0.023 | c |