SamHop Microelectronics Corp.

# SP2102

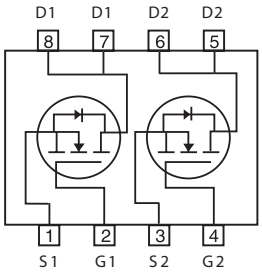
Ver 1.0

## Dual N-Channel Enhancement Mode Field Effect Transistor

| PRODUCT SUMMARY | | |
|---|---|---|
| $V_{DSS}$ | $I_D$ | $R_{DS(ON)}$ (mΩ) Max |
| 100V | 2.0A | 216 @ VGS=10V |

### FEATURES

- Super high dense cell design for low $R_{DS(ON)}$.
- Rugged and reliable.
- Suface Mount Package.


**ABSOLUTE MAXIMUM RATINGS** ($T_A$=25°C unless otherwise noted)

| Symbol | Parameter | | Limit | Units |
|---|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | | 100 | V |
| $V_{GS}$ | Gate-Source Voltage | | ±20 | V |
| $I_D$ | Drain Current-Continuous [a e] | $T_A$=25°C | 2.0 | A |
| | | $T_A$=70°C | 1.6 | A |
| $I_{DM}$ | -Pulsed [b] | | 13 | A |
| $E_{AS}$ | Single Pulse Avalanche Energy [d] | | 16 | mJ |
| $P_D$ | Maximum Power Dissipation [a] | $T_A$=25°C | 1.47 | W |
| | | $T_A$=70°C | 0.94 | W |
| $T_J$, $T_{STG}$ | Operating Junction and Storage Temperature Range | | -55 to 150 | °C |

**THERMAL CHARACTERISTICS**

| | | | |
|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 85 | °C/W |

## ELECTRICAL CHARACTERISTICS ($T_A$=25°C unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=250uA | 100 | | | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=80V , $V_{GS}$=0V | | | 1 | uA |
| $I_{GSS}$ | Gate-Body Leakage Current | $V_{GS}$= ±20V , $V_{DS}$=0V | | | ±100 | nA |
| **ON CHARACTERISTICS** | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$ , $I_D$=250uA | 1 | 1.7 | 2.5 | V |
| $R_{DS(ON)}$ | Drain-Source On-State Resistance | $V_{GS}$=10V , $I_D$=1A | | 173 | 216 | m ohm |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$=10V , $I_D$=1A | | 2 | | S |
| **DYNAMIC CHARACTERISTICS** [c] | | | | | | |
| $C_{ISS}$ | Input Capacitance | $V_{DS}$=25V,$V_{GS}$=0V f=1.0MHz | | 300 | | pF |
| $C_{OSS}$ | Output Capacitance | | | 35 | | pF |
| $C_{RSS}$ | Reverse Transfer Capacitance | | | 23 | | pF |
| **SWITCHING CHARACTERISTICS** [c] | | | | | | |
| $t_{D(ON)}$ | Turn-On Delay Time | $V_{DD}$=50V $I_D$=1A $V_{GS}$=10V $R_{GEN}$= 6 ohm | | 9 | | ns |
| tr | Rise Time | | | 9 | | ns |
| $t_{D(OFF)}$ | Turn-Off Delay Time | | | 17 | | ns |
| tf | Fall Time | | | 3.8 | | ns |
| $Q_g$ | Total Gate Charge | $V_{DS}$=50V,$I_D$=1A,$V_{GS}$=10V | | 5 | | nC |
| | | $V_{DS}$=50V,$I_D$=1A,$V_{GS}$=4.5V | | 3 | | nC |
| $Q_{gs}$ | Gate-Source Charge | $V_{DS}$=50V,$I_D$=1A, $V_{GS}$=10V | | 0.9 | | nC |
| $Q_{gd}$ | Gate-Drain Charge | | | 1.6 | | nC |
| **DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS** | | | | | | |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V,$I_S$=2A | | 0.83 | 1.2 | V |

### Notes

a.Surface Mounted on FR4 Board,t ≤ 10sec.
b.Pulse Test:Pulse Width ≤ 300us, Duty Cycle ≤ 2%.
c.Guaranteed by design, not subject to production testing.
d.Starting $T_J$=25°C,L=0.5mH,$V_{DD}$ = 50V.(See Figure13)
e.Drain current limited by maximum junction temperature.

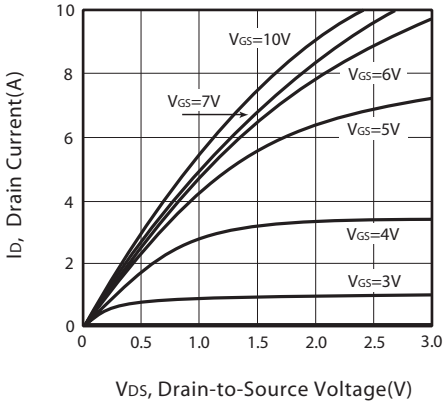



Figure 1. Output Characteristics

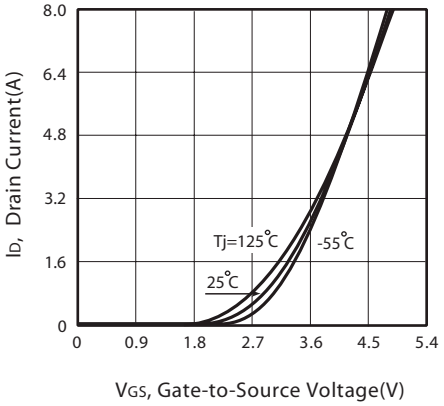



Figure 2. Transfer Characteristics

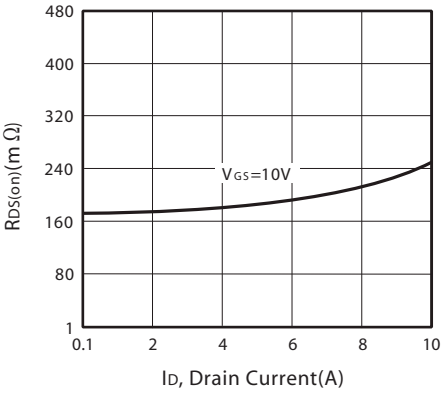



Figure 3. On-Resistance vs. Drain Current and Gate Voltage

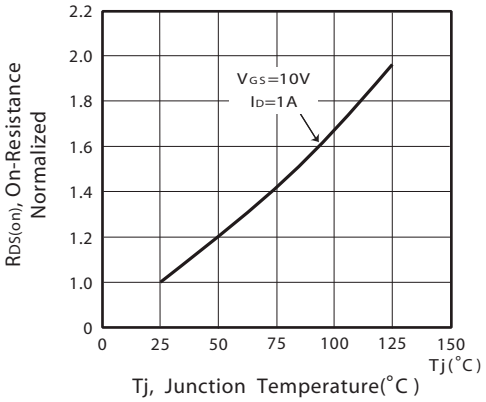



Figure 4. On-Resistance Variation with Drain Current and Temperature

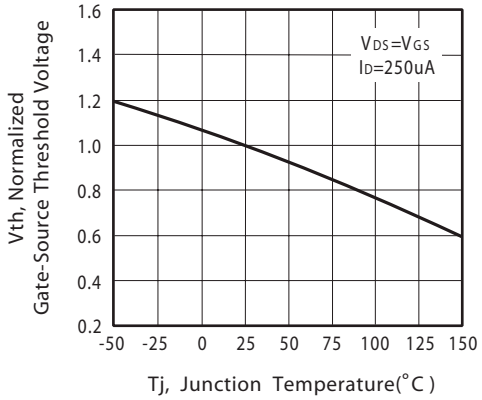



Figure 5. Gate Threshold Variation with Temperature

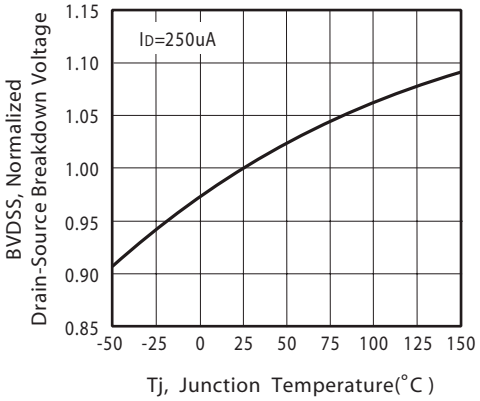



Figure 6. Breakdown Voltage Variation with Temperature

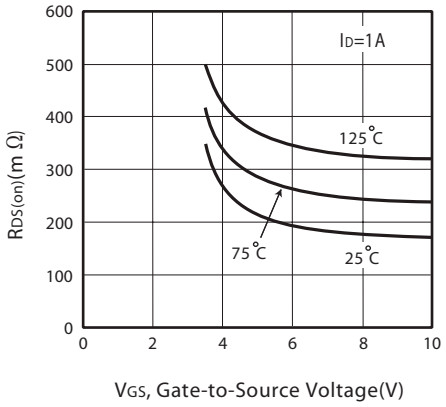



Figure 7. On-Resistance vs. Gate-Source Voltage

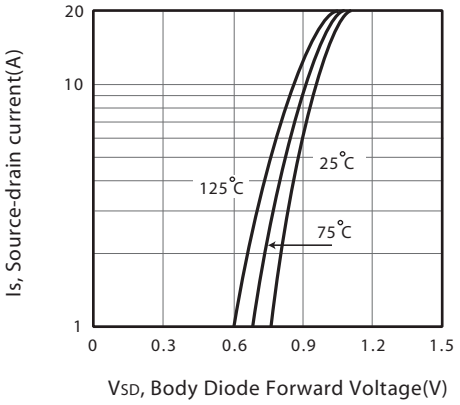



Figure 8. Body Diode Forward Voltage Variation with Source Current

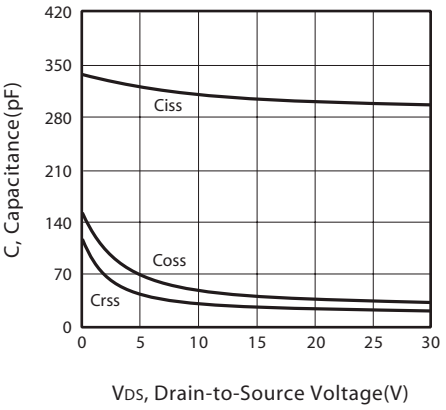



Figure 9. Capacitance

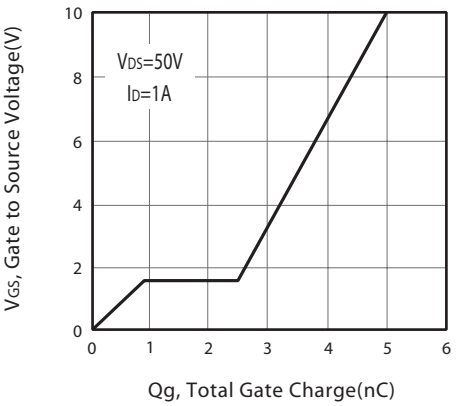



Figure 10. Gate Charge

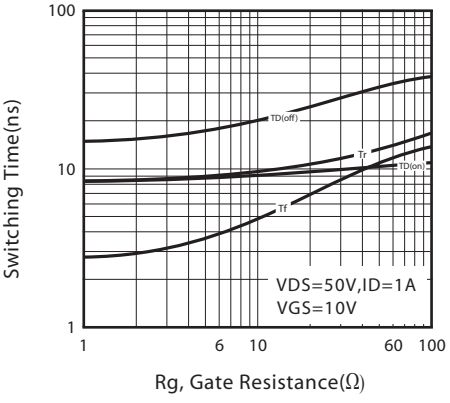



Figure 11. switching characteristics

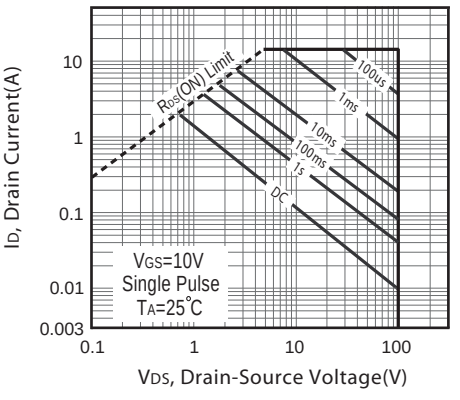
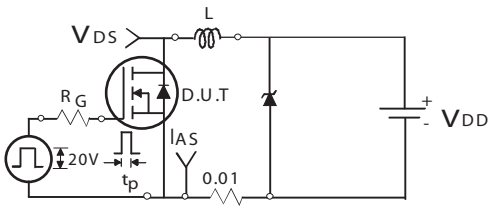
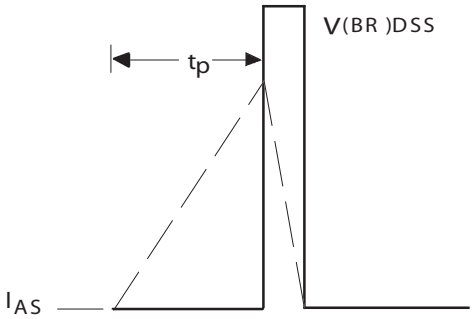



Figure 12. Maximum Safe Operating Area



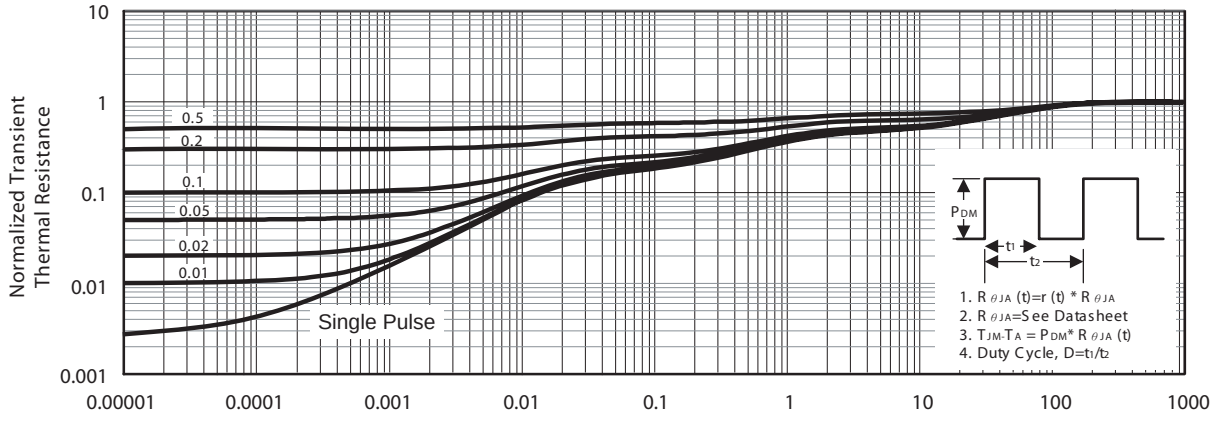

Unclamped Inductive Test Circuit

Figure 13a.




Unclamped Inductive Waveforms

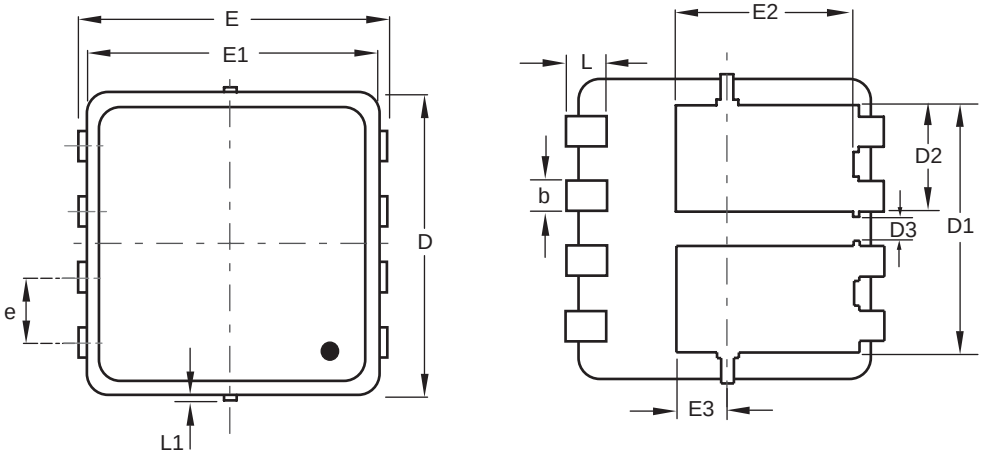
Figure 13b.




Normalized Thermal Transient Impedance Curve

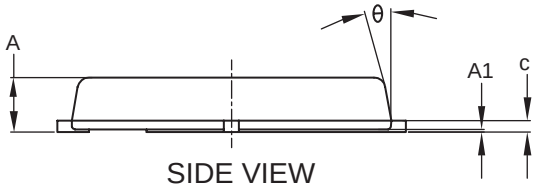
## PACKAGE OUTLINE DIMENSIONS

### DFN 3x3-8L




TOP VIEW

BOTTOM VIEW




SIDE VIEW

| SYMBOLS | MILLIMETERS | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| A | 0.70 | 0.80 | 0.90 |
| A1 | 0.00 | — | 0.05 |
| b | 0.24 | 0.30 | 0.35 |
| c | 0.10 | 0.152 | 0.25 |
| D | | 3.00 BSC | |
| D1 | | 2.475 BSC | |
| D2 | | 1.063 BSC | |
| D3 | | 0.225 BSC | |
| E | | 3.20 BSC | |
| E1 | | 3.00 BSC | |
| E2 | | 1.813 BSC | |
| E3 | | 0.525 BSC | |
| e | | 0.65 BSC | |
| L | 0.30 | 0.40 | 0.50 |
| L1 | 0.00 | — | 0.100 |
| θ | 0° | 10° | 12° |

## TOP MARKING DEFINITION

### DFN 3x3