SamHop Microelectronics Corp.

# SP1087C

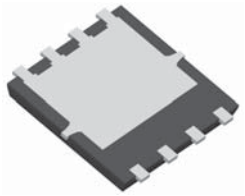
Ver 1.0

## N-Channel Logic Level Enhancement Mode Field Effect Transistor

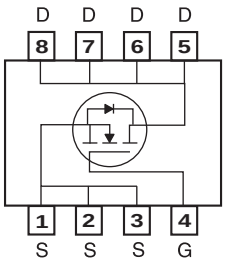
| PRODUCT SUMMARY | | |
|---|---|---|
| $V_{DSS}$ | $I_D$ | $R_{DS(ON)}$ (mΩ) Max |
| 100V | 68A | 6.9 @ VGS=10V |

### FEATURES

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




DFN 5x6




### ABSOLUTE MAXIMUM RATINGS ($T_C$=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 [c] | $T_C$=25°C | 68 | A |
| | | $T_C$=70°C | 54.4 | A |
| $I_{DM}$ | -Pulsed [a c] | | 138 | A |
| $E_{AS}$ | Single Pulse Avalanche Energy [d] | | 812 | mJ |
| $P_D$ | Maximum Power Dissipation | $T_C$=25°C | 83 | W |
| | | $T_C$=70°C | 53 | W |
| $T_J$, $T_{STG}$ | Operating Junction and Storage Temperature Range | | -55 to 150 | °C |

### THERMAL CHARACTERISTICS

| | | | |
|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | 1.5 | °C/W |

## ELECTRICAL CHARACTERISTICS (Tc=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 | 2 | 2.7 | 4 | V |
| $R_{DS(ON)}$ | Drain-Source On-State Resistance | $V_{GS}$=10V , $I_D$=34A | | 6.0 | 6.9 | m ohm |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$=10V , $I_D$=34A | | 81 | | S |
| **DYNAMIC CHARACTERISTICS** [b] | | | | | | |
| $C_{ISS}$ | Input Capacitance | $V_{DS}$=25V,$V_{GS}$=0V f=1.0MHz | | 3741 | | pF |
| $C_{OSS}$ | Output Capacitance | | | 500 | | pF |
| $C_{RSS}$ | Reverse Transfer Capacitance | | | 336 | | pF |
| **SWITCHING CHARACTERISTICS** [b] | | | | | | |
| $t_{D(ON)}$ | Turn-On Delay Time | $V_{DD}$=50V $I_D$=1A $V_{GS}$=10V $R_{GEN}$= 6 ohm | | 67 | | ns |
| $t_r$ | Rise Time | | | 130 | | ns |
| $t_{D(OFF)}$ | Turn-Off Delay Time | | | 122 | | ns |
| $t_f$ | Fall Time | | | 48 | | ns |
| $Q_g$ | Total Gate Charge | $V_{DS}$=50V,$I_D$=25A,$V_{GS}$=10V | | 58 | | nC |
| $Q_{gs}$ | Gate-Source Charge | $V_{DS}$=50V,$I_D$=25A, $V_{GS}$=10V | | 7.6 | | nC |
| $Q_{gd}$ | Gate-Drain Charge | | | 25 | | nC |
| **DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS** | | | | | | |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V,$I_S$=17A | | 0.76 | 1.3 | V |

### Notes

a.Pulse Test:Pulse Width ≤ 10us, Duty Cycle ≤ 1%.
b.Guaranteed by design, not subject to production testing.
c.Drain current limited by maximum junction temperature.
d.Starting $T_J$=25°C,L=0.5mH,$V_{DD}$ = 50V.(See Figure13)
e.Mounted on FR4 Board of 1 $inch^2$ , 2oz.

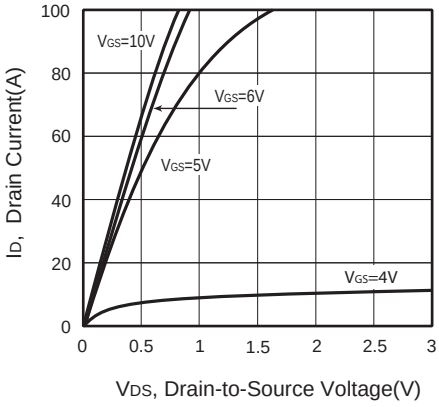



Figure 1. Output Characteristics

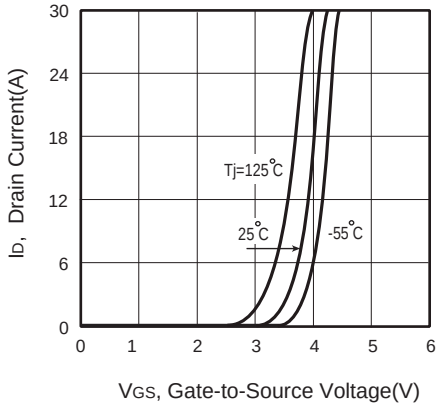



Figure 2. Transfer Characteristics

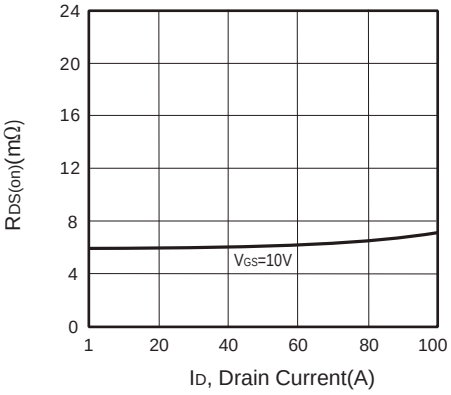



Figure 3. On-Resistance vs. Drain Current and Gate Voltage

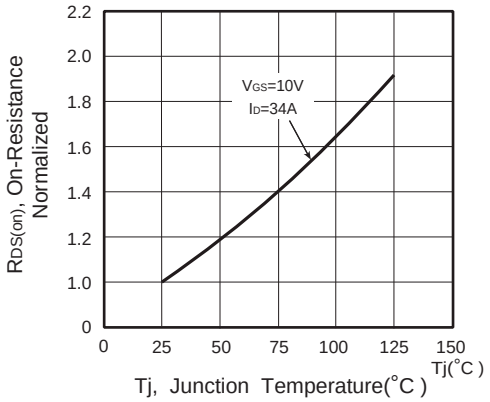



Figure 4. On-Resistance Variation with Drain Current and Temperature

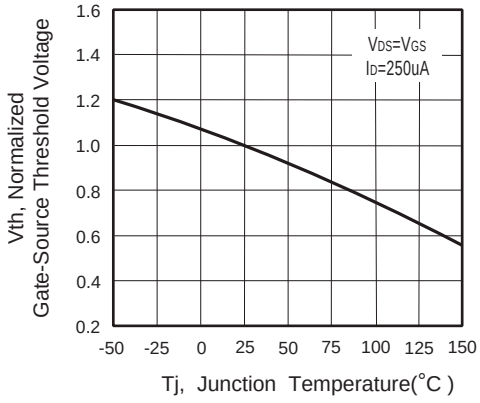



Figure 5. Gate Threshold Variation with Temperature

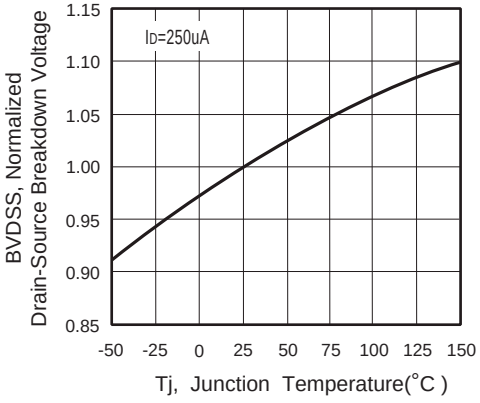



Figure 6. Breakdown Voltage Variation with Temperature

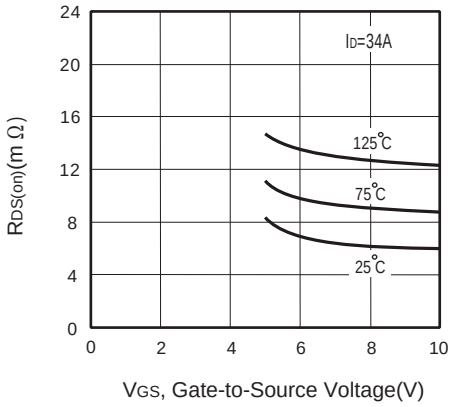



Figure 7. On-Resistance vs. Gate-Source Voltage

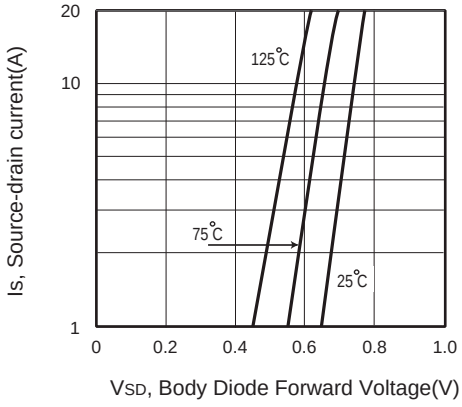



Figure 8. Body Diode Forward Voltage Variation with Source Current

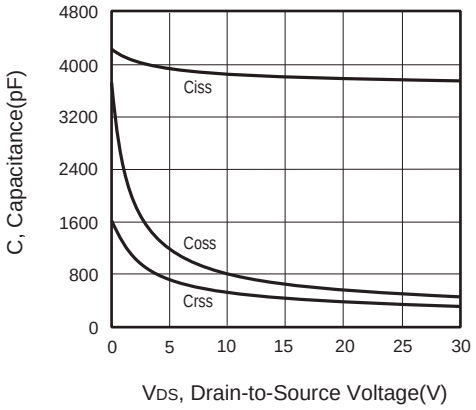



Figure 9. Capacitance

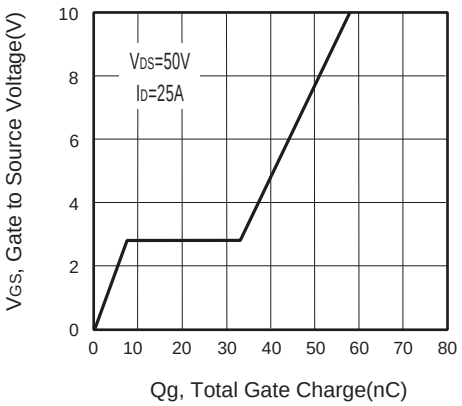



Figure 10. Gate Charge

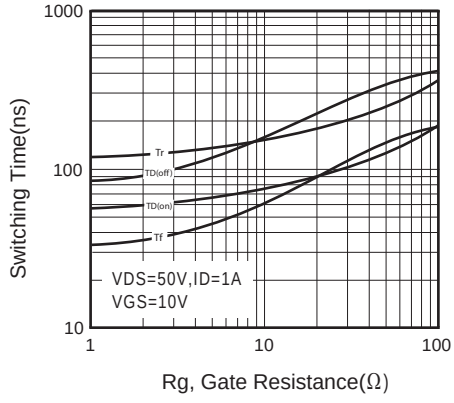



Figure 11. switching characteristics

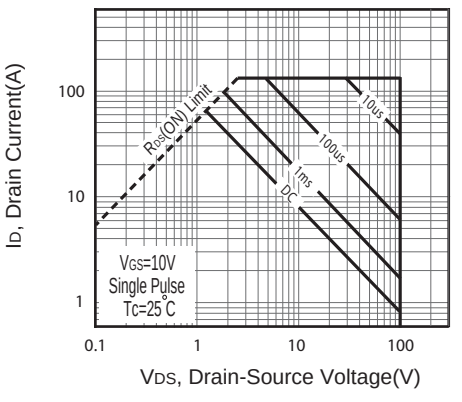
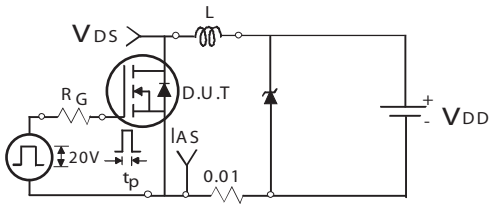
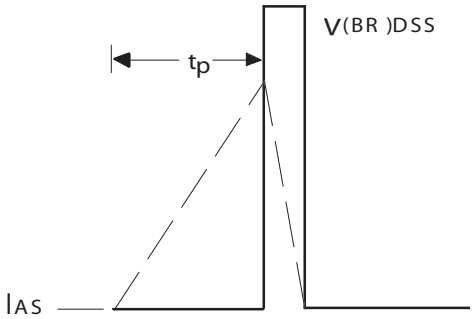



Figure 12. Maximum Safe Operating Area




Unclamped Inductive Test Circuit

Figure 13a.




Unclamped Inductive Waveforms

Figure 13b.

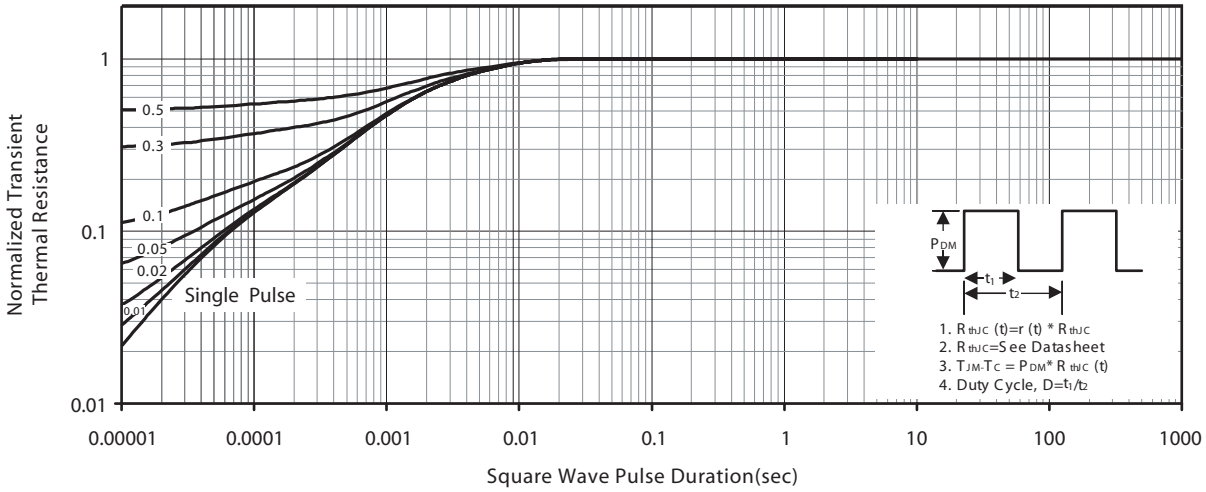
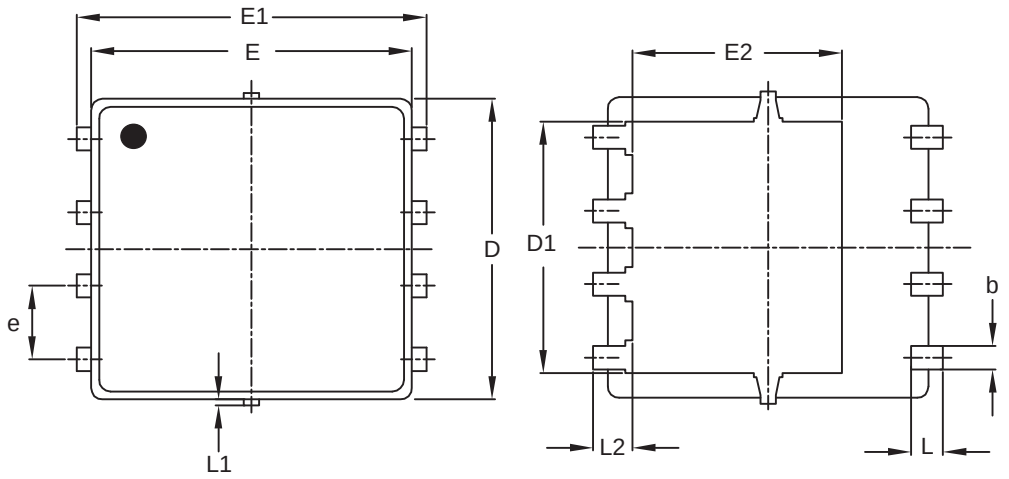
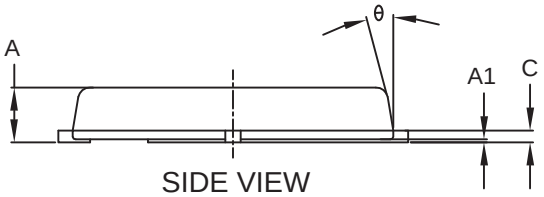



Figure 14. Normalized Thermal Transient Impedance Curve

## PACKAGE OUTLINE DIMENSIONS

### DFN 5x6-8L




| SYMBOLS | MILLIMETERS | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| A | 0.85 | 0.95 | 1.00 |
| A1 | 0.00 | — | 0.05 |
| b | 0.30 | 0.40 | 0.50 |
| c | 0.15 | 0.20 | 0.25 |
| D | | 5.20 BSC | |
| D1 | | 4.35 BSC | |
| E | | 5.55 BSC | |
| E1 | | 6.05 BSC | |
| E2 | | 3.62 BSC | |
| e | | 1.27 BSC | |
| L | 0.45 | 0.55 | 0.65 |
| L1 | 0.00 | — | 0.15 |
| L2 | | 0.68 REF | |
| θ | 0° | — | 10° |

## TOP MARKING DEFINITION

### DFN 5x6-8L