# DFN2020-6L Plastic-Encapsulate MOSFETS

## Features

- $V_{DS}$=-20V
- $I_D$=-20A
- $R_{DS(on)}$@$V_{GS}$=-4.5V ＜ 22mΩ
- $R_{DS(on)}$@$V_{GS}$=-2.5V ＜ 30mΩ
- Advanced trench cell design
- Low Thermal Resistance
- Low Gate Charge

**Drain-source Voltage**
-20 V
**Drain Current**
-20 Ampere

## Applications

- Motor/Body Load Control
- DC-DC Converters
- Load Switch

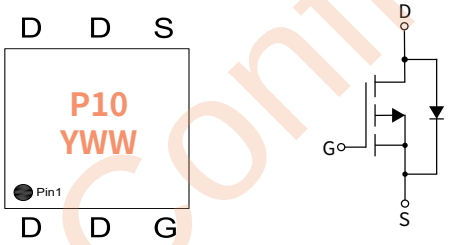
**DFN2020-6L**


## Mechanical Data

- Case: DFN2020-6L
  Molding compound meets UL 94V-0 flammability rating, RoHS-compliant,halogen-free
- Terminals: Solder plated, solderable per MIL-STD-750,Method 2026

## Function Diagram

Marking：P10
Date Code：YWW




## Ordering Information

| PACKAGE | PACKAGE CODE | UNIT WEIGHT(g) | REEL(pcs) | BOX(pcs) | CARTON(pcs) | DELIVERY MODE |
|---|---|---|---|---|---|---|
| DFN2020-6L | R1 | 0.01 | 3000 | 30000 | 120000 | 7'' |

## Maximum Ratings (Ta=25°C Unless otherwise specified)

| PARAMETER | SYMBOL | UNIT | VALUE |
|---|---|---|---|
| Drain-source Voltage | $V_{DS}$ | V | -20 |
| Gate-source Voltage | $V_{GS}$ | V | ±12 |
| Drain Current | $I_D$ | A | -20 |
| Pulsed Drain Current [1] | $I_{DM}$ | A | -32 |
| Avalanche Current | $I_{AS}$ | A | -9 |
| Single Pulse Avalanche Energy[2] | $E_{AS}$ | mJ | 4 |
| Total Power Dissipation | $P_D$ | W | 2.2 |
| Junction temperature | $T_J$ | °C | -55 ~+150 |
| Storage temperature | $T_{stg}$ | °C | -55 ~+150 |
| Thermal Resistance Junction-to-Case | $R_{\theta JC}$ | °C / W | 10 |
| Thermal Resistance Junction-to-Ambient [3] | $R_{\theta JA}$ | °C / W | 57 |

## Static Parameter Characteristics (Tj=25°C Unless otherwise specified)

| PARAMETER | SYMBOL | Condition | UNIT | Min | Typ | Max |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$= 0V, $I_D$=-250μA | V | -20 | — | — |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=-20V, $V_{GS}$=0V | μA | — | — | -1.0 |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$= ±12V, $V_{DS}$=0V | nA | — | — | ±100 |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$= $V_{GS}$, $I_D$=-250μA | V | -0.45 | -0.65 | -1.0 |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$= -4.5V, $I_D$=-7A | mΩ | — | 17 | 22 |
| | | $V_{GS}$= -2.5V, $I_D$=-4A | | — | 22 | 30 |

## Dynamic Parameters

| PARAMETER | SYMBOL | Condition | UNIT | Min | Typ | Max |
|---|---|---|---|---|---|---|
| Input Capacitance | $C_{iss}$ | $V_{DS}$=-10V, $V_{GS}$=0V, f=1MHZ | pF | — | 1782 | — |
| Output Capacitance | $C_{oss}$ | | | — | 255 | — |
| Reverse Transfer Capacitance | $C_{rss}$ | | | — | 245 | — |

## Switching Parameters

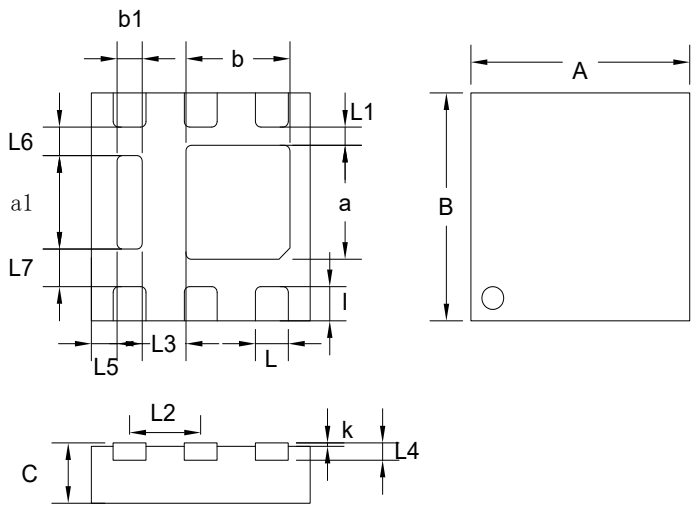
| PARAMETER | SYMBOL | Condition | UNIT | Min | Typ | Max |
|---|---|---|---|---|---|---|
| Turn-on Delay Time | $t_{D(on)}$ | $V_{GS}$=-10V, $V_{DD}$=-10V, $I_D$=-2.5A ,$R_{GEN}$=6Ω | nS | — | 21 | — |
| Turn-on Rise Time | $t_r$ | | nS | — | 16 | — |
| Turn-off Delay Time | $t_{D(off)}$ | | nS | — | 62 | — |
| Turn-off fall Time | $t_f$ | | nS | — | 36 | — |
| Total Gate Charge | $Q_g$ | $V_{DS}$=-10V, $I_D$=-2.5A $V_{GS}$=-10V | nC | — | 35 | — |
| Gate-Source Charge | $Q_{gs}$ | | nC | — | 1.4 | — |
| Gate-Drain Charge | $Q_{gd}$ | | nC | — | 5.2 | — |

## Drian-Source Diode Characteristics

| PARAMETER | SYMBOL | Condition | UNIT | Min | Typ | Max |
|---|---|---|---|---|---|---|
| Diode Forward Voltage | $V_{SD}$ | $I_S$=-20A, $V_{GS}$=0V | V | — | — | -1.2 |
| Maximum Body-Diode Continuous Current | $I_S$ | — | A | — | — | -20 |
| Body Diode Reverse Recovery Time | $t_{rr}$ | $I_S$=-20A, di/dt =100 A / μs | nS | — | 8.8 | — |
| Body Diode Reverse Recovery Charge | $Q_{rr}$ | | nC | — | 2.6 | — |

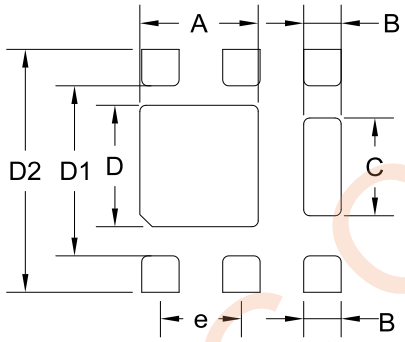
Note :
(1)Repetitive Rating: Pulse width limited by maximum junction temperature.Pulse test: Pulse width ⩽ 300us, duty cycle ⩽ 2%.
(2)Limited by $T_{J(MAX)}$, srarting $T_J$=25°C ,L=0.1mH,$R_g$=25Ω,$I_D$=-9A,$V_{GS}$=-10V.
(3)Device mounted on FR-4 substrate PC board,2oz copper,with 1-inch square copper plate in still air.

## Package Outline Dimensions (DFN2020-6L)



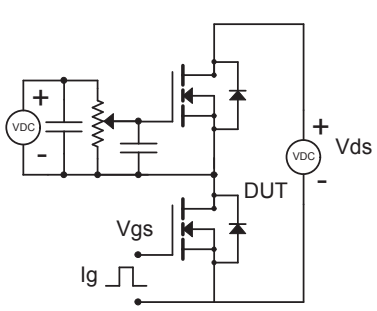

| Symbol | Dimensions | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 1.90 | 2.10 | 0.075 | 0.083 |
| B | 1.90 | 2.10 | 0.075 | 0.083 |
| C | 0.50 | 0.60 | 0.020 | 0.024 |
| L | 0.25 | 0.35 | 0.010 | 0.014 |
| L1 | 0.10 | 0.30 | 0.004 | 0.012 |
| L2 | 0.65 TYP | | 0.026 TYP | |
| L3 | 0.35TYP | | 0.014 TYP | |
| L4 | 0.127 TYP | | 0.005 TYP | |
| L5 | 0.12 | 0.32 | 0.005 | 0.013 |
| L6 | 0.15 | 0.35 | 0.006 | 0.014 |
| L7 | 0.25TYP | | 0.010TYP | |
| a | 0.75 | 0.85 | 0.030 | 0.033 |
| a1 | 0.75 | 0.85 | 0.030 | 0.033 |
| b | 0.90 | 1.0 | 0.035 | 0.039 |
| b1 | 0.25 | 0.35 | 0.010 | 0.014 |
| l | 0.30 | 0.40 | 0.012 | 0.016 |
| K | 0 | 0.05 | 0 | 0.002 |

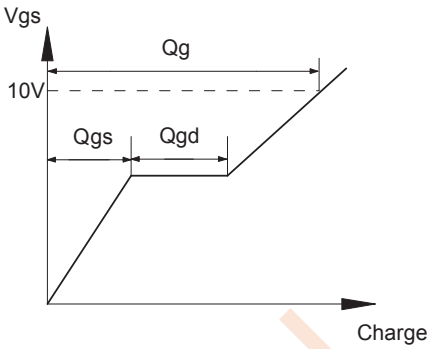
## Suggested Pad Layout



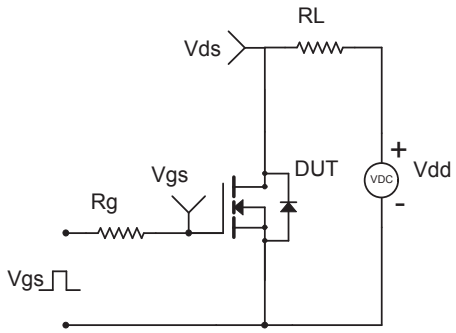

| Symbol | Dimensions | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 0.90 | 1.10 | 0.035 | 0.043 |
| B | 0.30 | 0.50 | 0.012 | 0.020 |
| C | 0.56 | 0.76 | 0.022 | 0.030 |
| D | 0.95 | 1.15 | 0.037 | 0.045 |
| D1 | 1.30 | 1.50 | 0.051 | 0.059 |
| D2 | 2.20 | 2.40 | 0.087 | 0.094 |
| e | 0.55 | 0.75 | 0.022 | 0.030 |

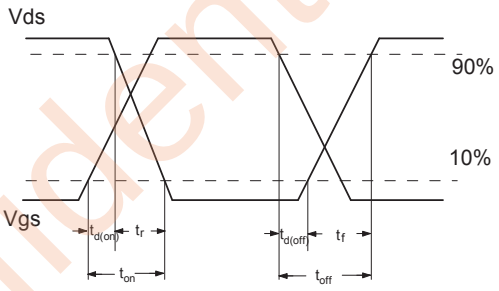
1.Gate Charge Test Circuit & Waveforms



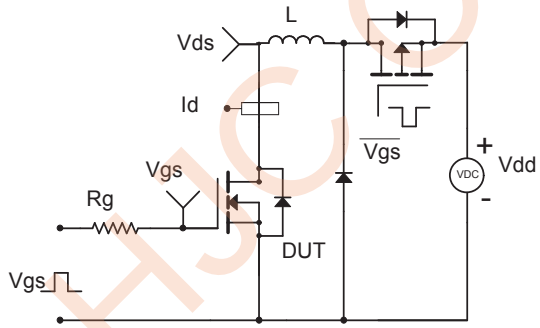



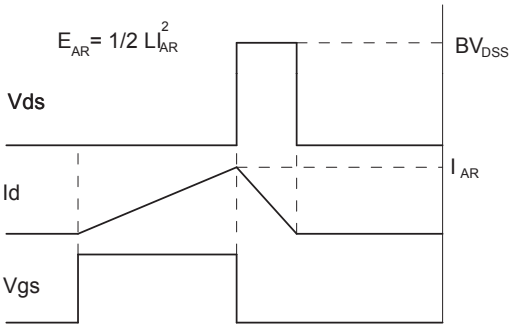

2. Resistive Switching Test Circuit & Waveforms




3.Unclamped Inductive Switching (UIS) Test Circuit & Waveforms




4.Diode Recovery Test Circuit & Waveforms