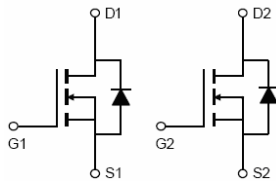


P-Channel Enhancement Mode Field Effect Transistor

DFN5X6-8L



Schematic diagram



Top View

Product Summary

- V_{DS} -30V
- I_D -18A
- $R_{DS(ON)}$ (at $V_{GS} = -4.5V$) <25mohm
- $R_{DS(ON)}$ (at $V_{GS} = -10V$) <18mohm

General Description

- Trench Power MV MOSFET technology
- High density cell design for Low $R_{DS(ON)}$
- High Speed switching

Applications

- Battery protection
- Load switch
- Power management

■ Absolute Maximum Ratings ($T_A=25^\circ\text{C}$ unless otherwise noted)

| Parameter | | Symbol | Maximum | Unit |
|--|--|-----------------|----------|---------------------------|
| Drain-source Voltage | | V_{DS} | -30 | V |
| Gate-source Voltage | | V_{GS} | ± 10 | V |
| Drain Current ^B | $T_A=25^\circ\text{C}$ @ Steady State | I_D | -18 | A |
| | $T_A=100^\circ\text{C}$ @ Steady State | | -12.6 | |
| Drain Current ^B | $T_A=25^\circ\text{C}$ @ Steady State | I_D | -18 | A |
| | $T_A=70^\circ\text{C}$ @ Steady State | | -12.6 | |
| Pulsed Drain Current ^A | | I_{DM} | -55 | A |
| Single Pulse Avalanche Energy ^B | | E_{AS} | 31 | mJ |
| Total Power Dissipation ^B | $T_A=25^\circ\text{C}$ @ Steady State | P_D | 32 | W |
| | $T_A=100^\circ\text{C}$ @ Steady State | | 12.8 | |
| Total Power Dissipation ^B | $T_A=25^\circ\text{C}$ @ Steady State | P_D | 3 | W |
| | $T_A=70^\circ\text{C}$ @ Steady State | | 1.9 | |
| Thermal Resistance Junction-to-Ambient @ Steady State ^B | | $R_{\theta JC}$ | 3.9 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance Junction-to-Case @ Steady State ^C | | $R_{\theta JA}$ | 42 | $^\circ\text{C}/\text{W}$ |
| Junction and Storage Temperature Range | | T_J, T_{STG} | -55~+150 | $^\circ\text{C}$ |

■ Ordering Information (Example)

| PREFERRED P/N | PACKING CODE | Marking | MINIMUM PACKAGE(pcs) | INNER BOX QUANTITY(pcs) | OUTER CARTON QUANTITY(pcs) | DELIVERY MODE |
|---------------|--------------|----------------|----------------------|-------------------------|----------------------------|---------------|
| HM18DP03D | F1 | HM18DP03D XXXX | 5000 | 10000 | 100000 | 13" reel |

■ **Electrical Characteristics** ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

| Parameter | Symbol | Conditions | Min | Typ | Max | Units |
|---------------------------------------|--------------|--|------|------|-----------|------------|
| Static Parameter | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=-250\mu A$ | -30 | | | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=-30V, V_{GS}=0V, T_C=25^{\circ}C$ | | | -1 | μA |
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}= \pm 10V, V_{DS}=0V$ | | | ± 100 | nA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}= V_{GS}, I_D=-250\mu A$ | -1.0 | -1.5 | -2.4 | V |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}= -4.5V, I_D=-15A$ | | 20 | 25 | m Ω |
| | | $V_{GS}= -10V, I_D=-8A$ | | 15 | 18 | |
| | | $V_{GS}= -1.8V, I_D=-6.0A$ | | 20 | 30 | |
| Diode Forward Voltage | V_{SD} | $I_S=-18A, V_{GS}=0V$ | | -0.8 | -1.2 | V |
| Maximum Body-Diode Continuous Current | I_S | | | | -1 A | A |
| Dynamic Parameters | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}=-10V, V_{GS}=0V, f=1MHZ$ | | 2992 | | pF |
| Output Capacitance | C_{oss} | | | 330 | | |
| Reverse Transfer Capacitance | C_{rss} | | | 272 | | |
| Switching Parameters | | | | | | |
| Total Gate Charge | Q_g | $V_{GS}=-10V, V_{DS}=-15V, I_D=-9.1A$ | | 72.8 | | nC |
| Gate Source Charge | Q_{gs} | | | 6.6 | | |
| Gate Drain Charge | Q_{gd} | | | 10.1 | | |
| Reverse Recovery Charge | Q_{rr} | $I_F=-6A, di/dt=100A/us$ | | 34 | | |
| Reverse Recovery Time | t_{rr} | | | 67 | | |
| Turn-on Delay Time | $t_{D(on)}$ | $V_{GS}=-10V, V_{DS}=-15V, I_D=-6A, R_{GEN}=2.5\Omega$ | | 7 | | ns |
| Turn-on Rise Time | t_r | | | 33 | | |
| Turn-off Delay Time | $t_{D(off)}$ | | | 130 | | |
| Turn-off Fall Time | t_f | | | 132 | | |

A. Pulse Test: Pulse Width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

B. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance, where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design, while $R_{\theta JA}$ is determined by the board design. The maximum rating presented here is based on mounting on a 1 in 2 pad of 2oz copper.

■ Typical Performance Characteristics

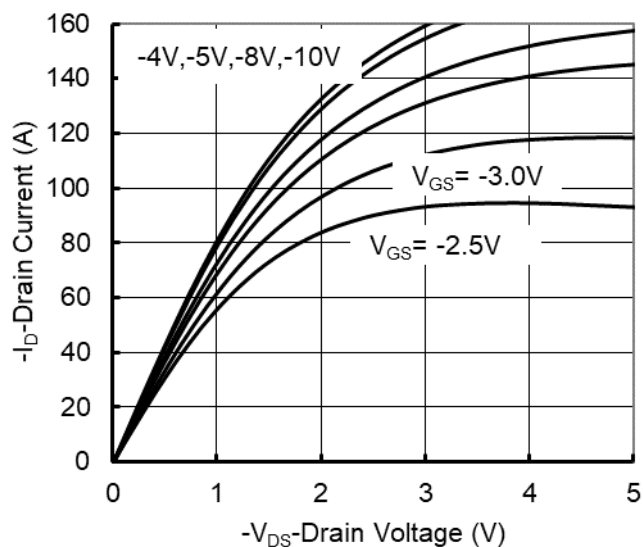


Figure 1. Output Characteristics

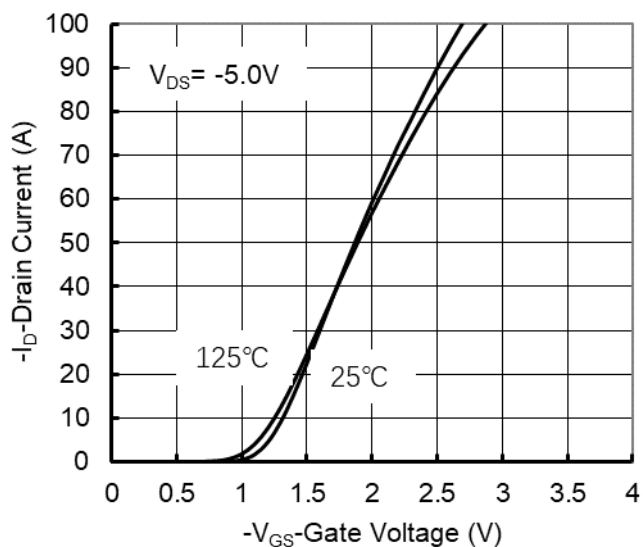


Figure 2. Transfer Characteristics

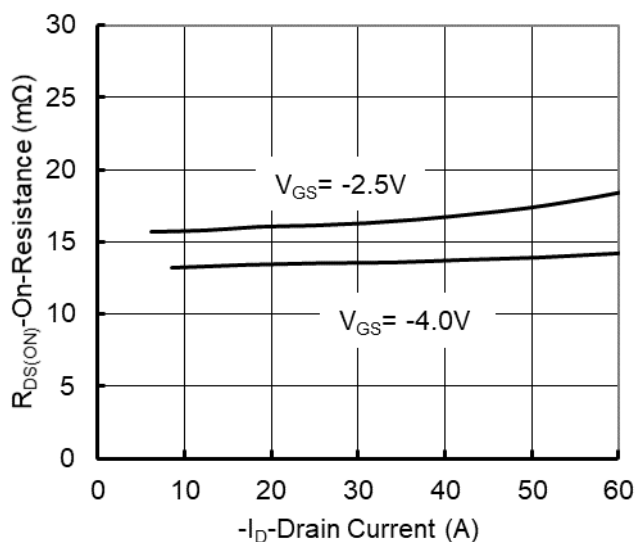


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

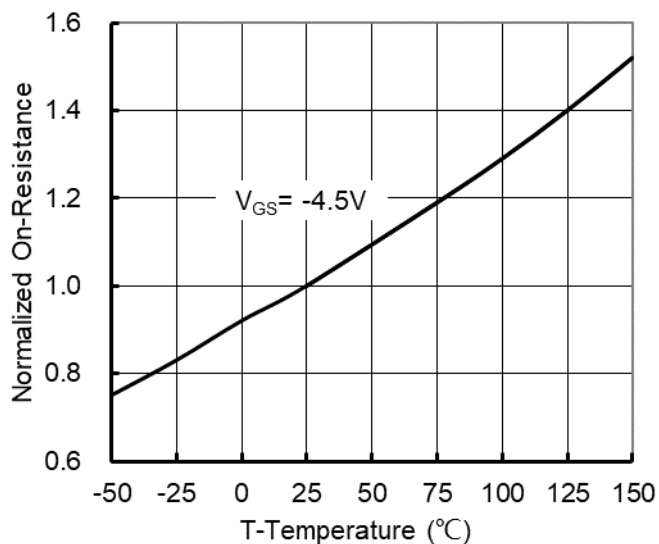


Figure 4. On-Resistance vs. Junction Temperature

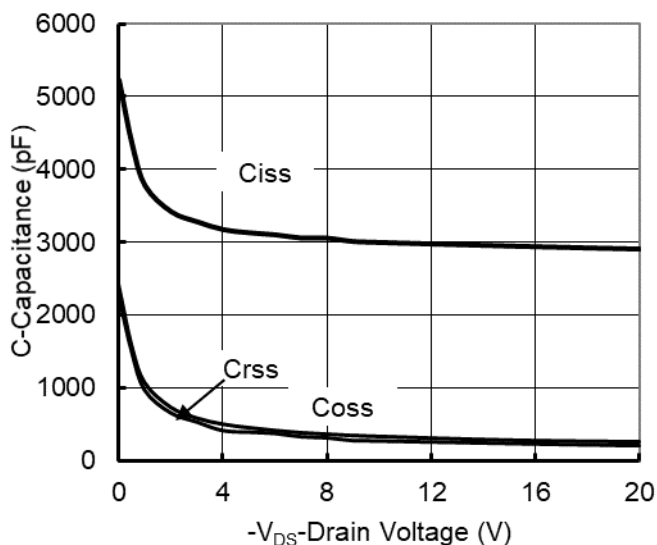


Figure 5. Capacitance Characteristics

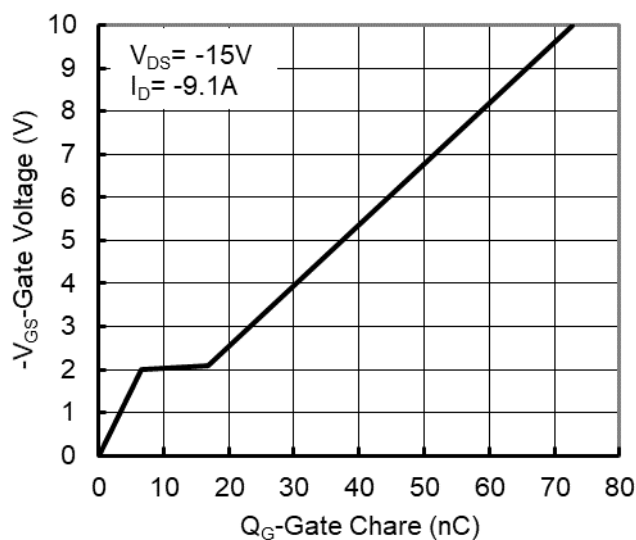


Figure 6. Gate Charge

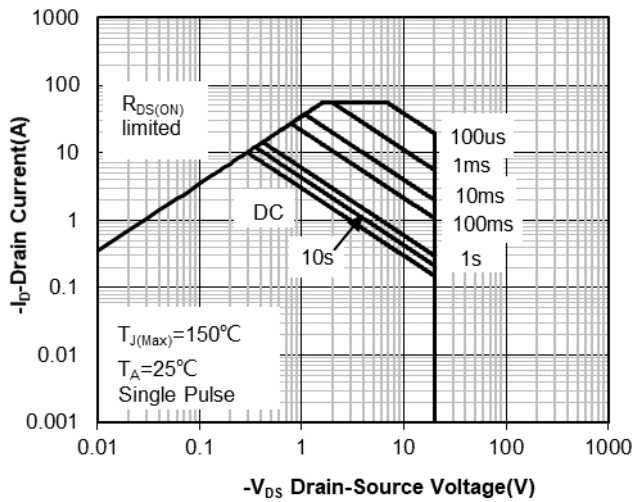


Figure 7. Safe Operation Area

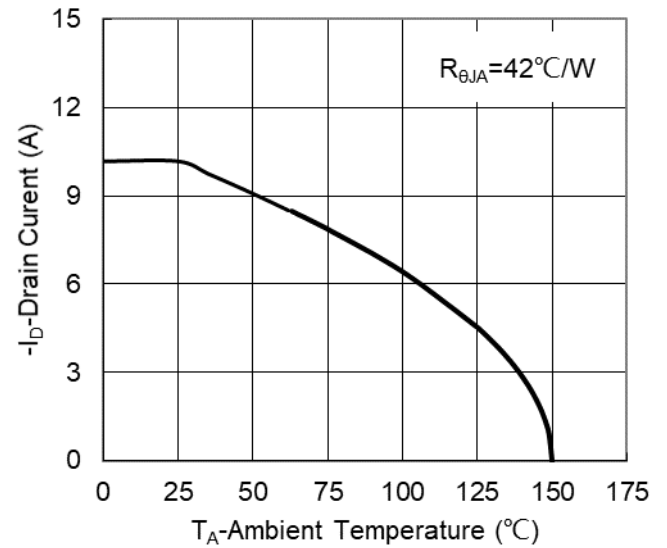


Figure 8. Maximum Continuous Drain Current vs Ambient Temperature

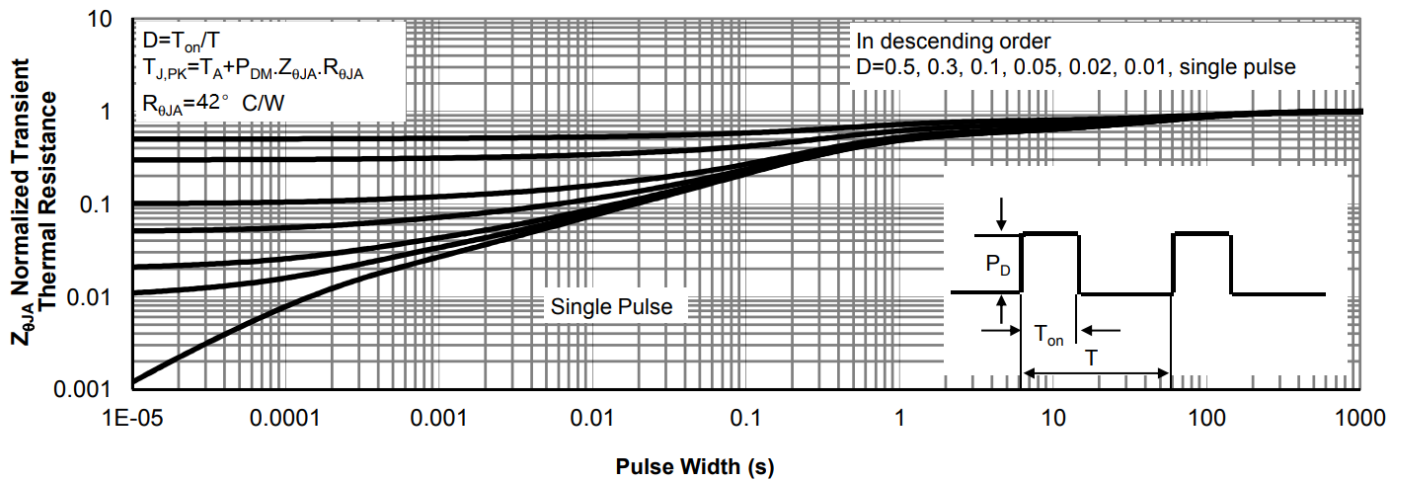
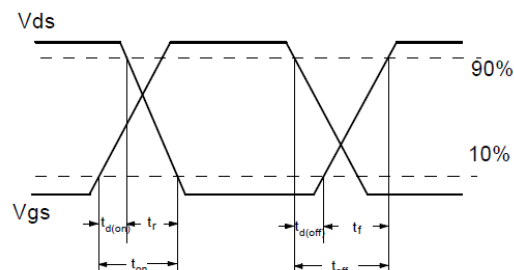
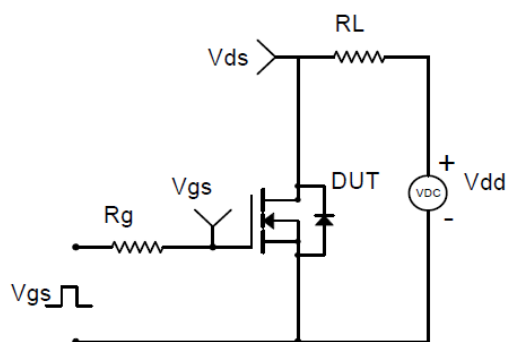
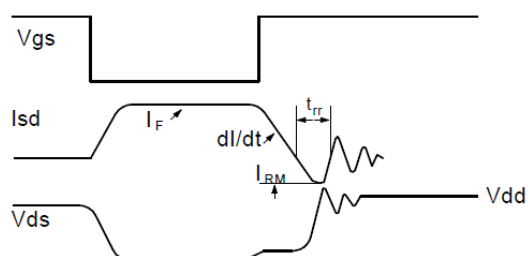
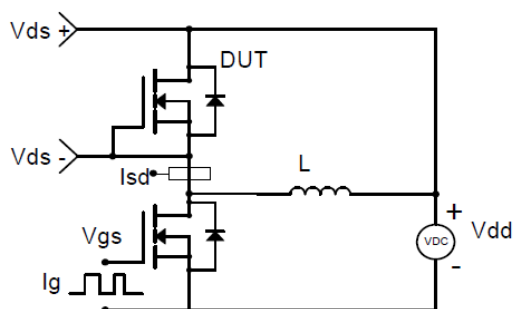


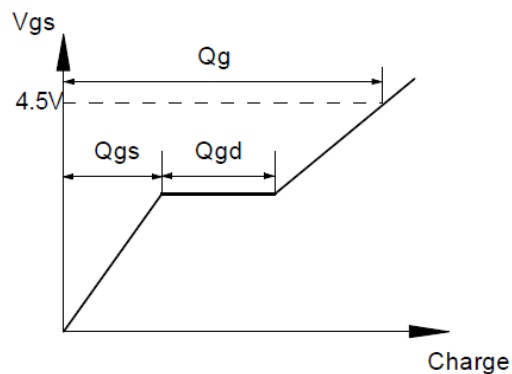
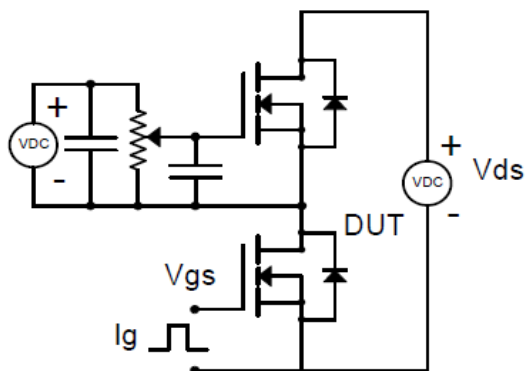
Figure 9. Normalized Maximum Transient Thermal Impedance



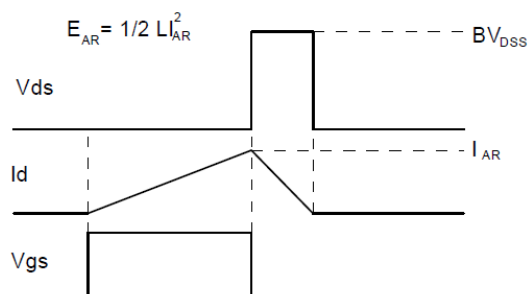
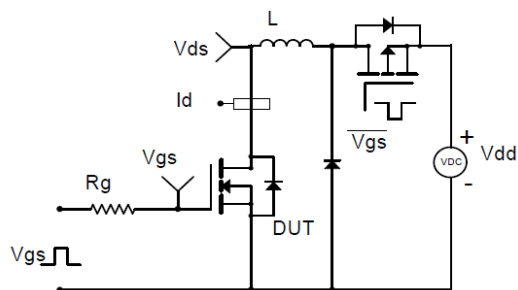
Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

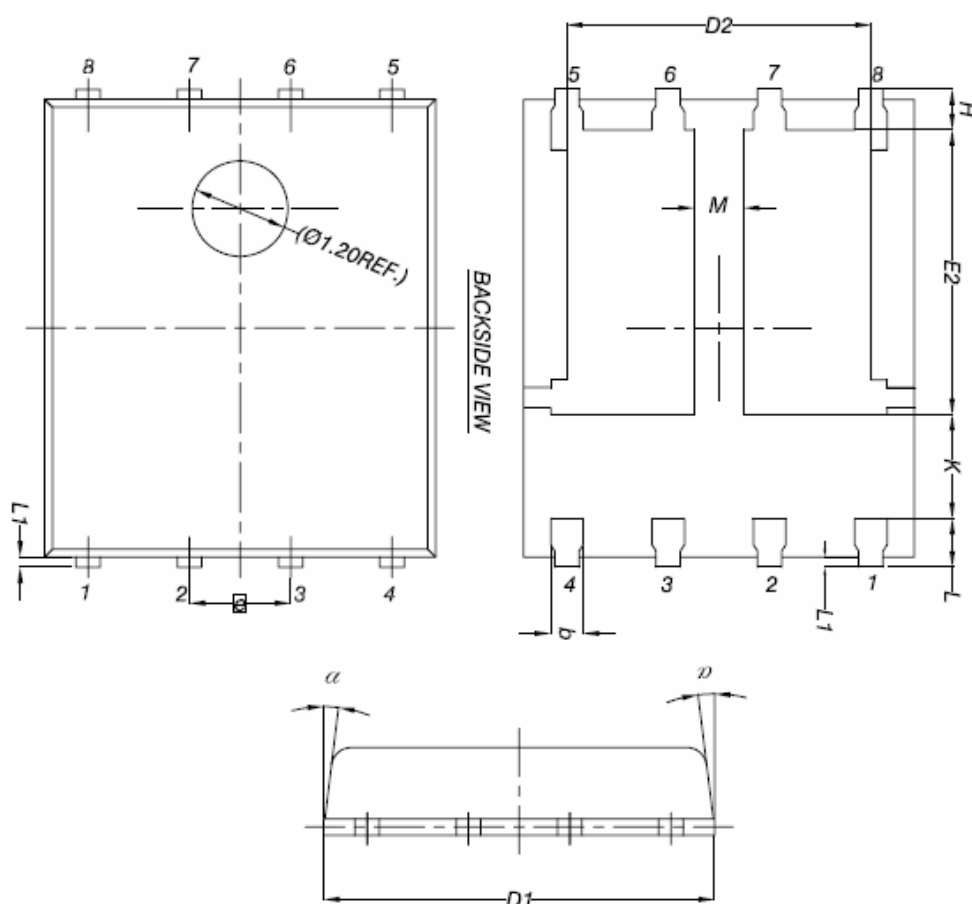


Gate Charge Test Circuit & Waveform



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

DFN5X6-8L Package Information



| DIM. | MILLIMETERS | | |
|------|-------------|------|------|
| | MIN. | NOM. | MAX. |
| A | 0.90 | 1.00 | 1.10 |
| b | 0.33 | 0.41 | 0.51 |
| C | 0.20 | 0.25 | 0.30 |
| D1 | 4.80 | 4.90 | 5.00 |
| D2 | 3.61 | 3.81 | 3.96 |
| E | 5.90 | 6.00 | 6.10 |
| E1 | 5.70 | 5.75 | 5.80 |
| E2 | 3.38 | 3.58 | 3.78 |
| e | 1.27 BSC | | |
| H | 0.41 | 0.51 | 0.61 |
| K | 1.10 | - | - |
| L | 0.51 | 0.61 | 0.71 |
| L1 | 0.06 | 0.13 | 0.20 |
| M | 0.50 | - | - |
| α | 0° | - | 12° |

