

## Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

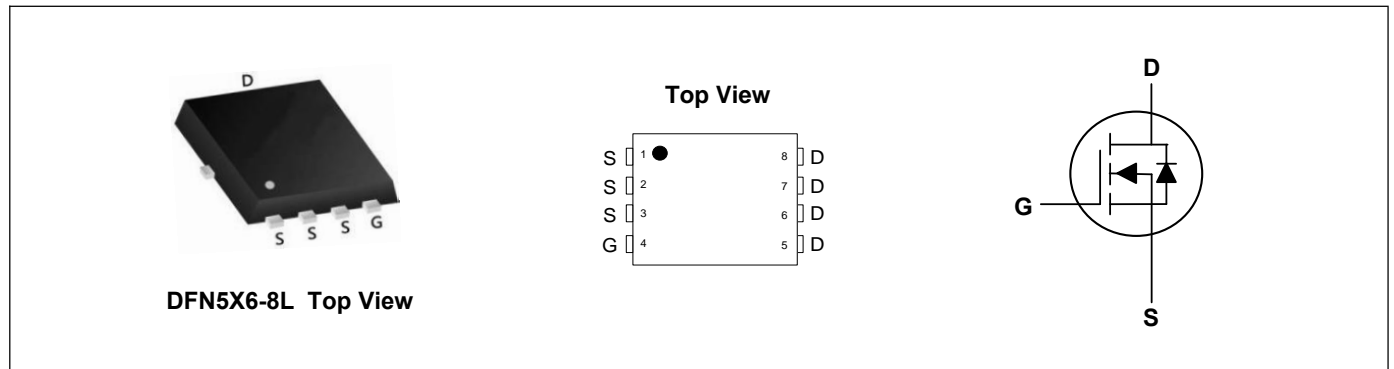
## Applications

- High Frequency Point-of-Load Synchronous Buck Converter
- Networking DC-DC Power System
- LCD/LED Back Light

## Product Summary



|                                  |      |            |
|----------------------------------|------|------------|
| $V_{DS}$                         | 100  | V          |
| $I_D$                            | 60   | A          |
| $R_{DS(ON)}$ (at $V_{GS}=10V$ )  | 8    | m $\Omega$ |
| $R_{DS(ON)}$ (at $V_{GS}=4.5V$ ) | 10.5 | m $\Omega$ |



## Absolute Maximum Ratings( $T_C=25^\circ C$ , unless otherwise noted)

| Parameter  | Symbol               | Rating     | Units      |
|--|----------------------|------------|------------|
| Drain-Source Voltage                             | $V_{DS}$             | 100        | V          |
| Gate-Source Voltage                              | $V_{GS}$             | $\pm 20$   | V          |
| Continuous Drain Current, $V_{GS}$ @ $10V^{1,6}$ | $I_D@T_C=25^\circ C$ | 60         | A          |
| Continuous Drain Current, $V_{GS}$ @ $10V^{1,6}$ | $I_D@T_C=70^\circ C$ | 48         | A          |
| Pulsed Drain Current <sup>2</sup>                | $I_{DM}$             | 140        | A          |
| Single Pulse Avalanche Energy <sup>3</sup>       | EAS                  | 61         | mJ         |
| Avalanche Current                                | $I_{AS}$             | 35         | A          |
| Total Power Dissipation <sup>4</sup>             | $P_D@T_C=25^\circ C$ | 108        | W          |
| Storage Temperature Range                        | $T_{STG}$            | -55 to 150 | $^\circ C$ |
| Operating Junction Temperature Range             | $T_J$                | -55 to 150 | $^\circ C$ |

## Thermal Characteristics

| Parameter   | Symbol          | Typ | Max  | Unit         |
|---|-----------------|-----|------|--------------|
| Thermal Resistance Junction-Ambient <sup>1</sup> ( $t \leq 10S$ ) | $R_{\theta JA}$ | --- | 25   | $^\circ C/W$ |
| Thermal Resistance Junction-Ambient <sup>1</sup>                  |                 | --- | 55   | $^\circ C/W$ |
| Thermal Resistance Junction-Case <sup>1</sup>                     | $R_{\theta JC}$ | --- | 1.15 | $^\circ C/W$ |

**Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)**

| Parameter                                      | Symbol              | Conditions  | Min | Typ  | Max  | Unit |
|--|---------------------|---|-----|------|------|------|
| Drain-Source Breakdown Voltage                 | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA  | 100 | ---  | ---  | V    |
| Static Drain-Source On-Resistance <sup>2</sup> | R <sub>DS(ON)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =13.5A   | --- | 6.6  | 8    | mΩ   |
|  |                     | V <sub>GS</sub> =4.5V, I <sub>D</sub> =11.5A  | --- | 8.7  | 10.5 | mΩ   |
| Gate Threshold Voltage                         | V <sub>GS(th)</sub> | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA                              | 1.2 | ---  | 2.3  | V    |
| Drain-Source Leakage Current                   | I <sub>DSS</sub>    | V <sub>DS</sub> =80V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C                       | --- | ---  | 1    | uA   |
|  |                     | V <sub>DS</sub> =80V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C                       | --- | ---  | 5    |      |
| Gate-Source Leakage Current                    | I <sub>GSS</sub>    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V  | --- | ---  | ±100 | nA   |
| Forward Transconductance                       | g <sub>fs</sub>     | V <sub>DS</sub> =5V, I <sub>D</sub> =20A  | --- | 85   | ---  | S    |
| Total Gate Charge (10V)                        | Q <sub>g</sub>      | V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>D</sub> =13.5A                     | --- | 45   | ---  | nC   |
| Total Gate Charge (4.5V)                       | Q <sub>g</sub>      |   | --- | 19.3 | ---  |      |
| Gate-Source Charge                             | Q <sub>gs</sub>     |   | --- | 9.5  | ---  |      |
| Gate-Drain Charge                              | Q <sub>gd</sub>     |   | --- | 4.8  | ---  |      |
| Turn-On Delay Time                             | T <sub>d(on)</sub>  | V <sub>DD</sub> =50V, V <sub>GS</sub> =10V, R <sub>G</sub> =3Ω, I <sub>D</sub> =13.5A | --- | 10   | ---  | ns   |
| Rise Time                                      | T <sub>r</sub>      |   | --- | 6.5  | ---  |      |
| Turn-Off Delay Time                            | T <sub>d(off)</sub> |   | --- | 45   | ---  |      |
| Fall Time                                      | T <sub>f</sub>      |   | --- | 7.5  | ---  |      |
| Input Capacitance                              | C <sub>iss</sub>    | V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz                                     | --- | 3320 | ---  | pF   |
| Output Capacitance                             | C <sub>oss</sub>    |   | --- | 605  | ---  |      |
| Reverse Transfer Capacitance                   | C <sub>rss</sub>    |   | --- | 20   | ---  |      |

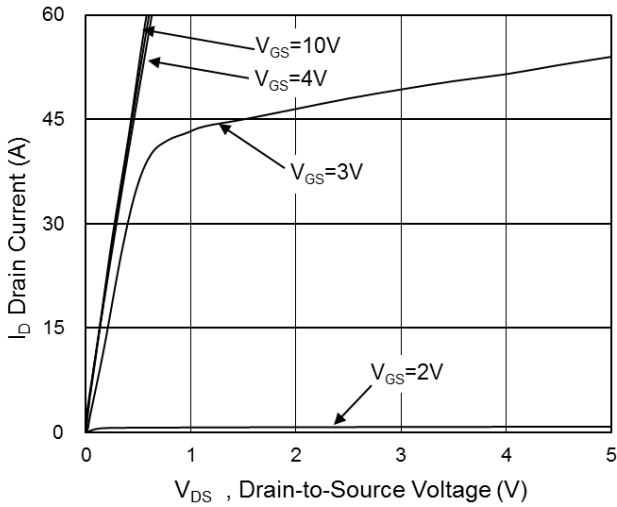
**Drain-Source Diode Characteristics**

| Parameter                                | Symbol          | Conditions  | Min | Typ | Max | Unit |
|--|-----------------|---|-----|-----|-----|------|
| Continuous Source Current <sup>1,5</sup> | I <sub>S</sub>  | V <sub>G</sub> =V <sub>D</sub> =0V, Force Current             | --- | --- | 60  | A    |
| Diode Forward Voltage <sup>2</sup>       | V <sub>SD</sub> | V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C | --- | --- | 1.1 | V    |
| Reverse Recovery Time                    | t <sub>rr</sub> | I <sub>F</sub> =13.5A, di/dt=100A/μs, T <sub>J</sub> =25°C    | --- | 33  | --- | nS   |
| Reverse Recovery Charge                  | Q <sub>rr</sub> |   | --- | 150 | --- | nC   |

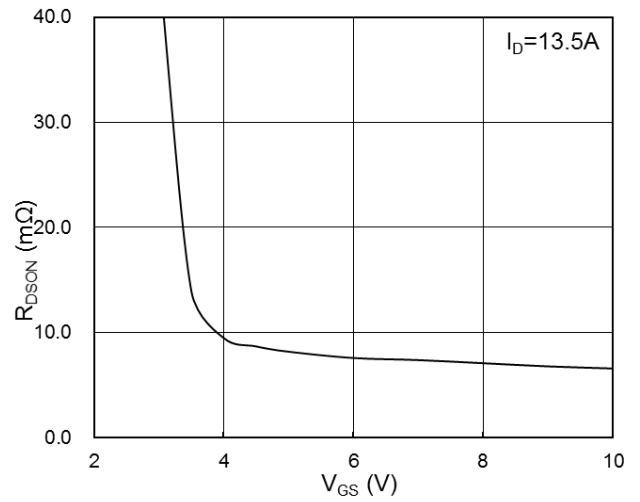
**Note:**

- The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- The EAS data shows Max. rating. The test condition is V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.1mH, I<sub>AS</sub>=35A
- The power dissipation is limited by 150°C junction temperature
- The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.
- The maximum current rating is package limited.

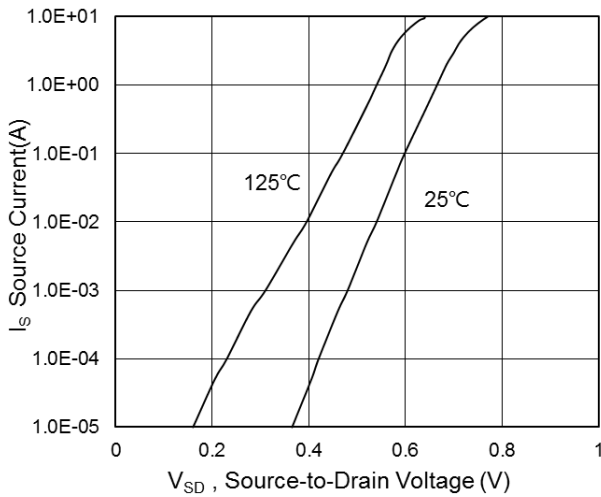
**Typical Characteristics**



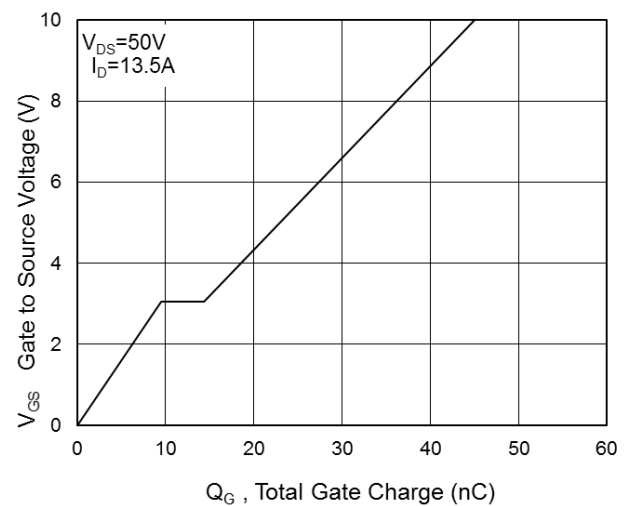
**Fig.1 Typical Output Characteristics**



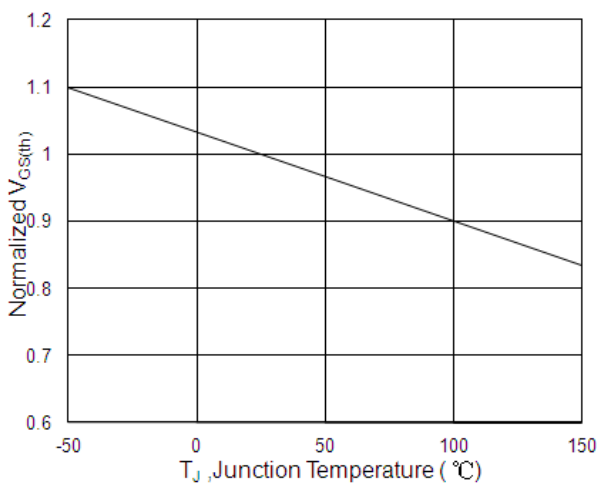
**Fig.2 On-Resistance vs G-S Voltage**



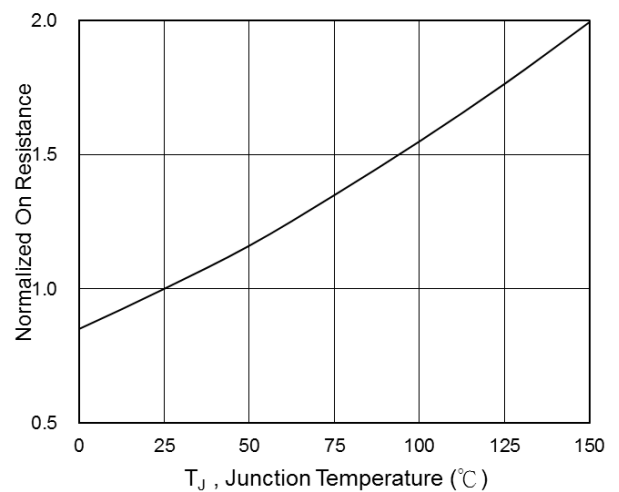
**Fig.3 Source-Drain Forward Characteristics**



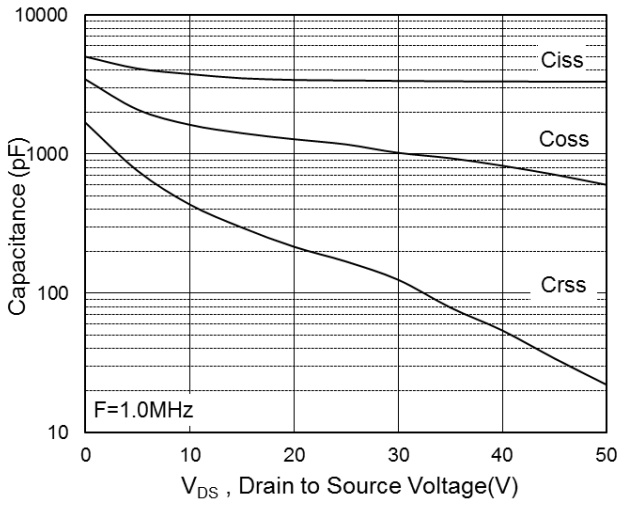
**Fig.4 Gate-Charge Characteristics**



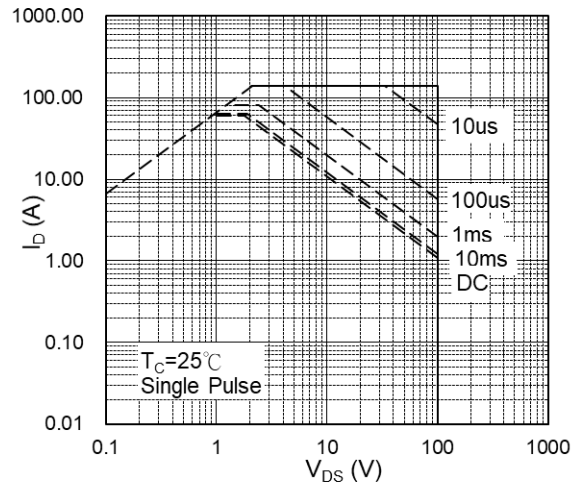
**Fig.5 Normalized  $V_{GS(th)}$  vs  $T_J$**



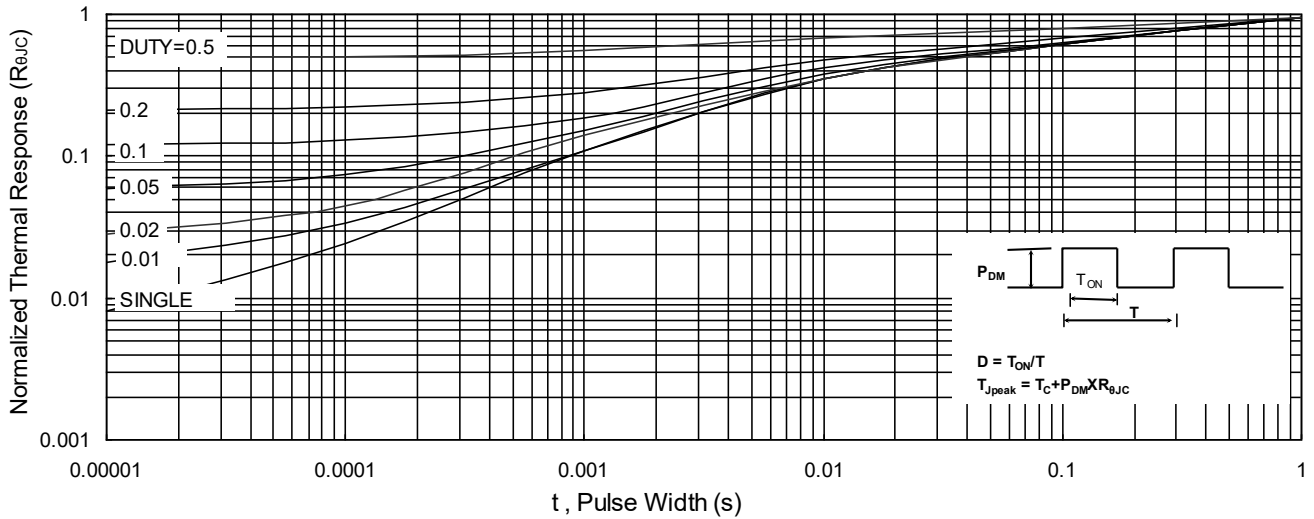
**Fig.6 Normalized  $R_{DSON}$  vs  $T_J$**



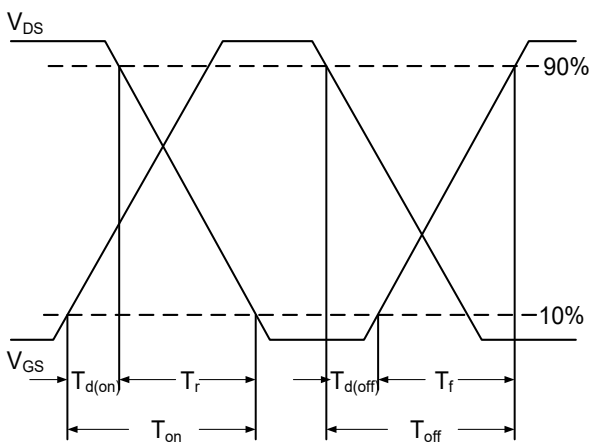
**Fig.7 Capacitance**



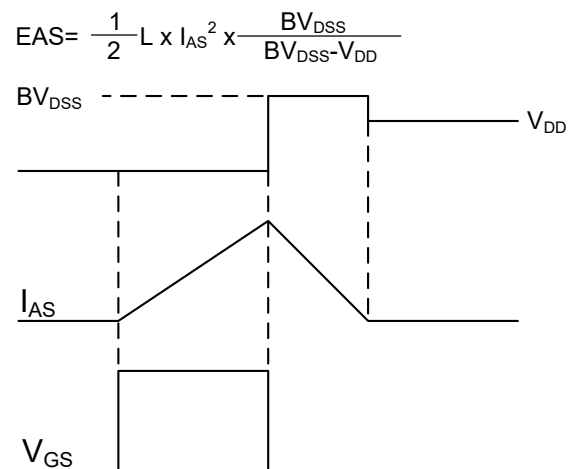
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**

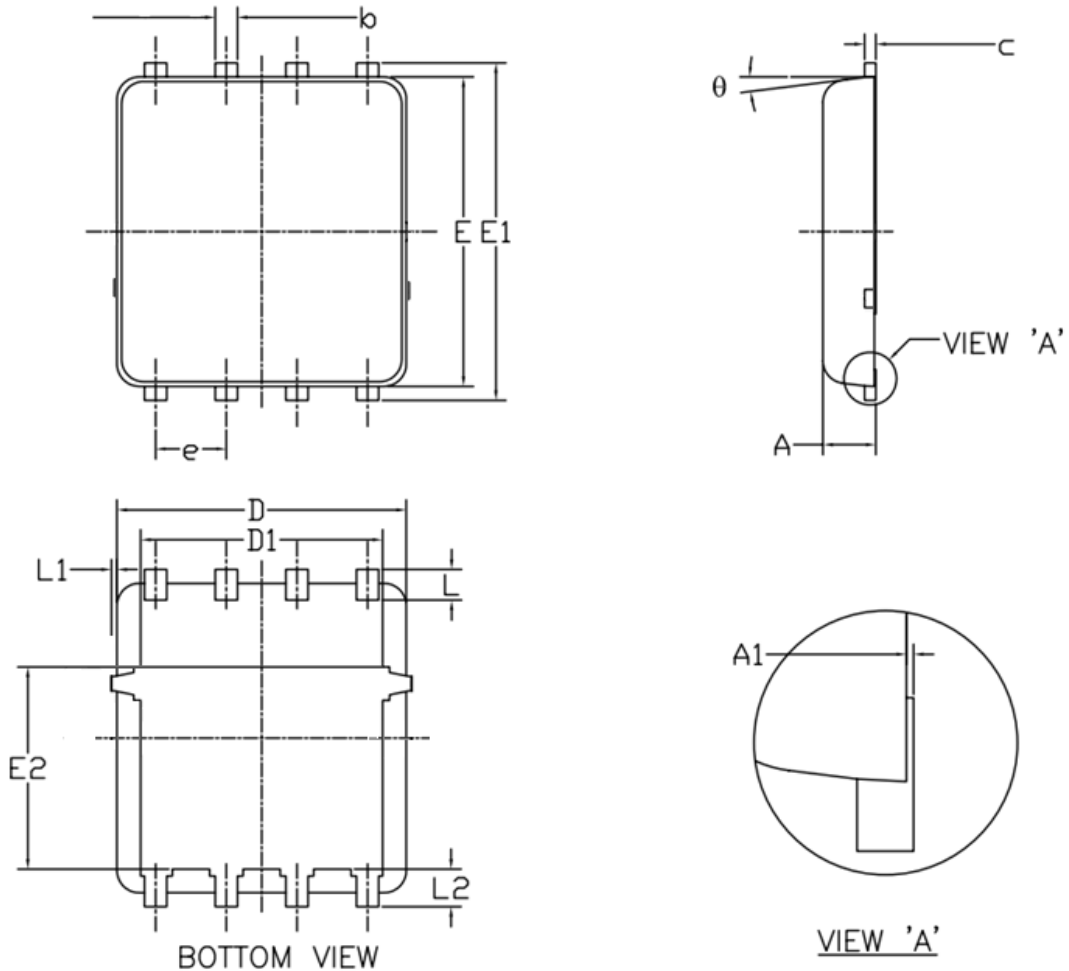


**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Switching Waveform**

**DFN5X6-8L Package Outline Dimensions**



| Symbol    | Dimensions (unit:mm) |      |      | Symbol    | Dimensions (unit:mm) |      |      |
|-----------|----------------------|------|------|-----------|----------------------|------|------|
|           | Min                  | Typ  | Max  |           | Min                  | Typ  | Max  |
| <b>A</b>  | 0.90                 | 1.00 | 1.20 | <b>E1</b> | 5.90                 | 6.10 | 6.35 |
| <b>A1</b> | 0.00                 | --   | 0.05 | <b>E2</b> | 3.38                 | 3.58 | 3.92 |
| <b>b</b>  | 0.30                 | 0.40 | 0.51 | <b>e</b>  | 1.27 BSC             |      |      |
| <b>c</b>  | 0.20                 | 0.25 | 0.33 | <b>L</b>  | 0.51                 | 0.61 | 0.71 |
| <b>D</b>  | 4.80                 | 4.90 | 5.40 | <b>L1</b> | --                   | --   | 0.15 |
| <b>D1</b> | 3.61                 | 4.00 | 4.25 | <b>L2</b> | 0.41                 | 0.51 | 0.61 |
| <b>E</b>  | 5.65                 | 5.80 | 6.06 | <b>θ</b>  | 0°                   | --   | 12°  |