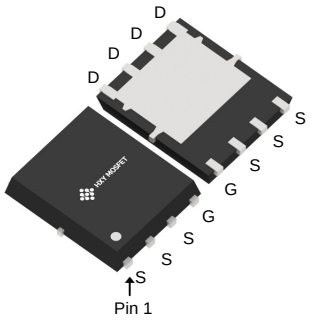
## General Description

The NVMFS5C645NT1G use advanced SGT MOSFET technology to provide low RDS(ON), low gate charge, fast switching and excellent avalanche characteristics. This device is specially designed to get better ruggedness and suitable.

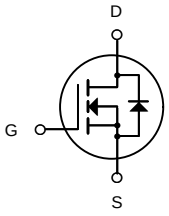



DFN5X6-8L

## General Features

$V_{DS}$ = 60V $I_D$ = 100A

$R_{DS(ON)}$ < 5mΩ @ $V_{GS}$=10V




N-Channel MOSFET

## Applications

Consumer electronic power supply Motor control

Synchronous-rectification Isolated DC

Synchronous-rectification applications

## Package Marking and Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|---|---|---|---|
| NVMFS5C645NT1G | DFN5X6-8L | HXY MOSFET | 5000 |

## Absolute Maximum Ratings ($T_C$ =25°C unless otherwise noted)

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 60 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_C$=25°C | Continuous Drain Current, $V_{GS}$ @ 10V | 100 | A |
| $I_D$@$T_C$=100°C | Continuous Drain Current, $V_{GS}$ @ 10V | 64 | A |
| $I_{DM}$ | Pulsed Drain Current[2] | 385 | A |
| EAS | Single Pulse Avalanche Energy[3] | 80 | mJ |
| $P_D$@$T_C$=25°C | Total Power Dissipation[4] | 73.5 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | °C |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | °C |
| $R_{\theta JC}$ | Thermal Resistance from Junction-to-Ambient[3] | 1.7 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient [1] | 51 | °C/W |

## Electrical Characteristics ($T_J$ = 25°C, unless otherwise noted)

| Parameter | | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ = 250μA | 60 | - | - | V |
| Gate-body Leakage Current | | $I_{GSS}$ | $V_{DS}$ = 0V, $V_{GS}$ = ±20V | - | - | ±100 | nA |
| Zero Gate Voltage Drain Current | $T_J$=25°C | $I_{DSS}$ | $V_{DS}$ = 60V, $V_{GS}$ = 0V | - | - | 1 | μA |
| | $T_J$=100°C | | | - | - | 100 | |
| Gate-Threshold Voltage | | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | 2 | 2.9 | 4 | V |
| Drain-Source On-Resistance[4] | | $R_{DS(on)}$ | $V_{GS}$ = 10V, $I_D$ = 21A | - | 3.7 | 5 | mΩ |
| Forward Transconductance[4] | | $g_{fs}$ | $V_{DS}$ = 10V, $I_D$ = 21A | - | 89 | - | S |
| Input Capacitance | | $C_{iss}$ | $V_{DS}$ = 30V, $V_{GS}$ =0V, f =1MHz | - | 1673 | - | pF |
| Output Capacitance | | $C_{oss}$ | | - | 773 | - | |
| Reverse Transfer Capacitance | | $C_{rss}$ | | - | 46.8 | - | |
| Gate Resistance | | $R_g$ | f = 1MHz | - | 1.8 | - | Ω |
| Total Gate Charge | | $Q_g$ | $V_{GS}$ = 10V, $V_{DS}$ = 30V, $I_D$= 21A | - | 28.5 | - | nC |
| Gate-Source Charge | | $Q_{gs}$ | | - | 7.8 | - | |
| Gate-Drain Charge | | $Q_{gd}$ | | - | 8.4 | - | |
| Turn-On Delay Time | | $t_{d(on)}$ | $V_{GS}$ =10V, $V_{DD}$ = 30V, $R_G$ = 3Ω, $I_D$= 21A | - | 11.2 | - | ns |
| Rise Time | | $t_r$ | | - | 8.2 | - | |
| Turn-Off Delay Time | | $t_{d(off)}$ | | - | 19.6 | - | |
| Fall Time | | $t_f$ | | - | 6.2 | - | |
| Body Diode Reverse Recovery Time | | $t_{rr}$ | $I_F$=21A, dI/dt=100A/μs | - | 50 | - | ns |
| Body Diode Reverse Recovery Charge | | $Q_{rr}$ | | - | 20 | - | nC |
| Diode Forward Voltage[4] | | $V_{SD}$ | $I_S$ = 21A, $V_{GS}$ = 0V | - | - | 1.2 | V |
| Continuous Source Current | $T_C$=25°C | $I_S$ | - | - | - | 100 | A |

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C
2. The EAS data shows Max. rating . The test condition is $V_{DD}$=25V,$V_{GS}$=10V,L=0.1mH，$I_{AS}$=40A.
3. The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
5. This value is guaranteed by design hence it is not included in the production test.

## Typical Characteristics

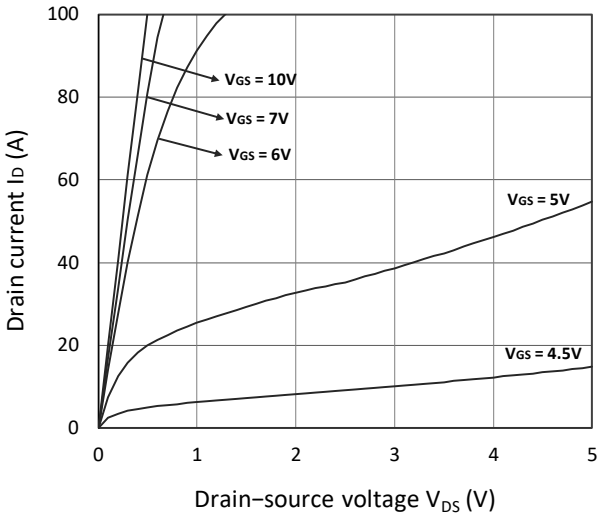



Figure 1. Output Characteristics

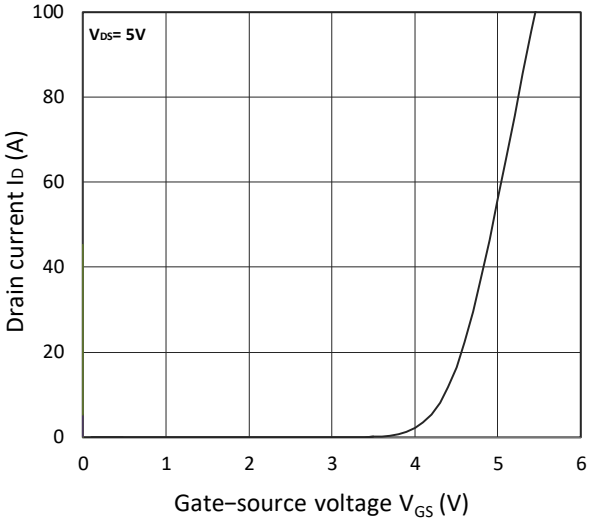



Figure 2. Transfer Characteristics

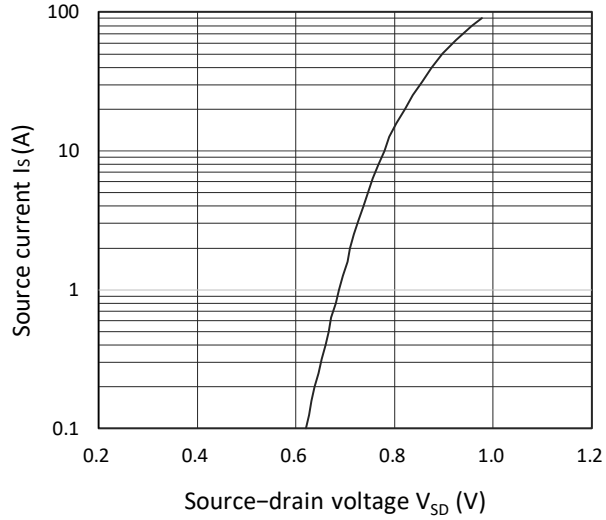



Figure 3. Forward Characteristics of Reverse

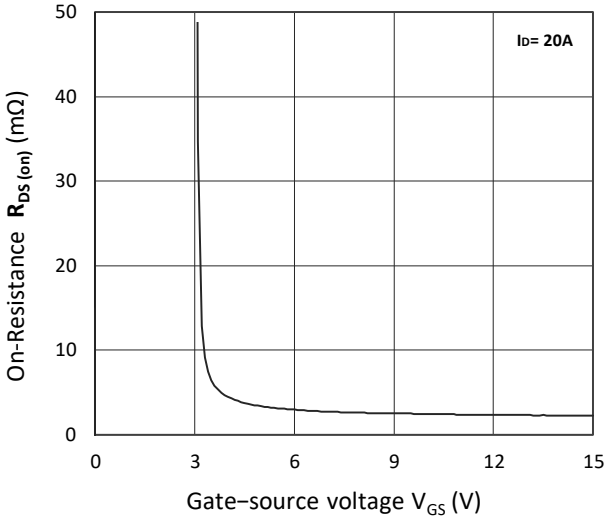



Figure 4. $R_{DS(ON)}$ vs. $V_{GS}$

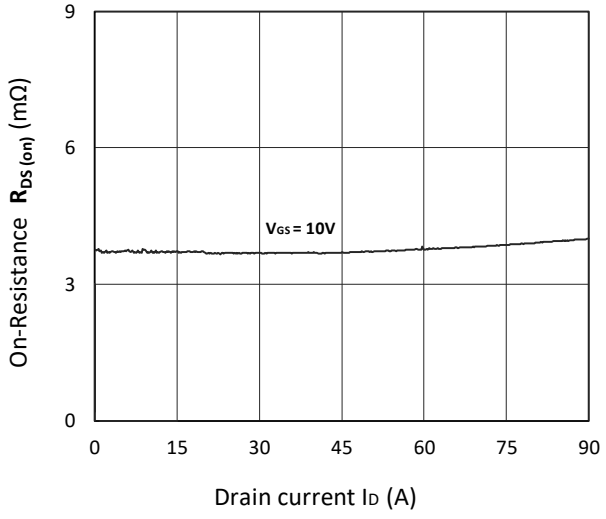



Figure 5. $R_{DS(ON)}$ vs. $I_D$

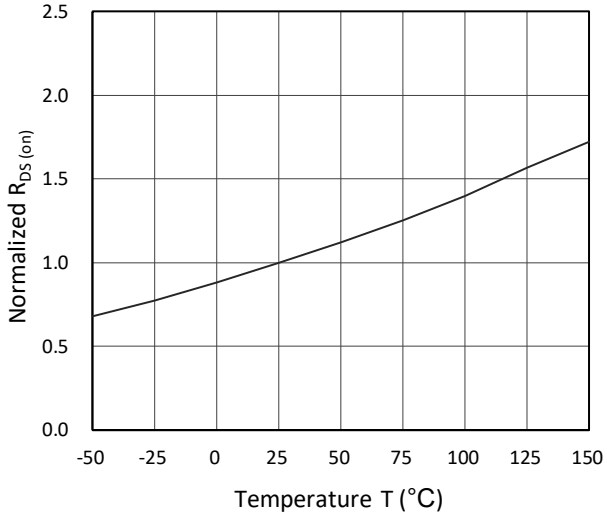



Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

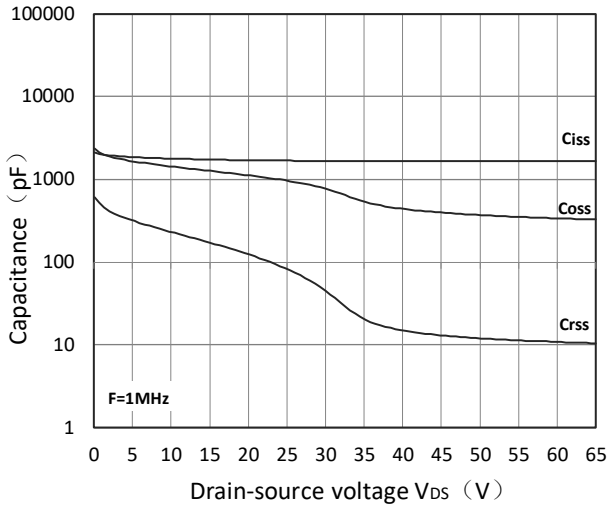



Figure 7. Capacitance Characteristics

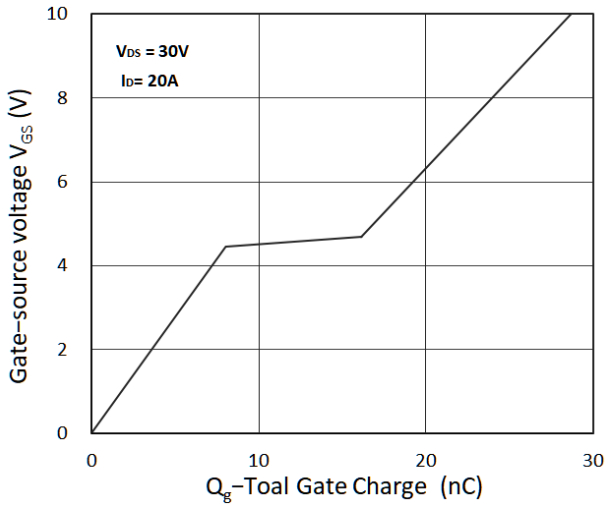



Figure 8. Gate Charge Characteristics

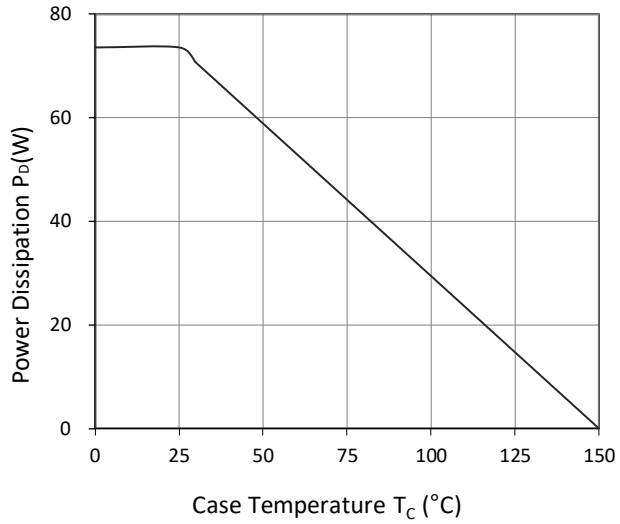



Figure 9. Power Dissipation

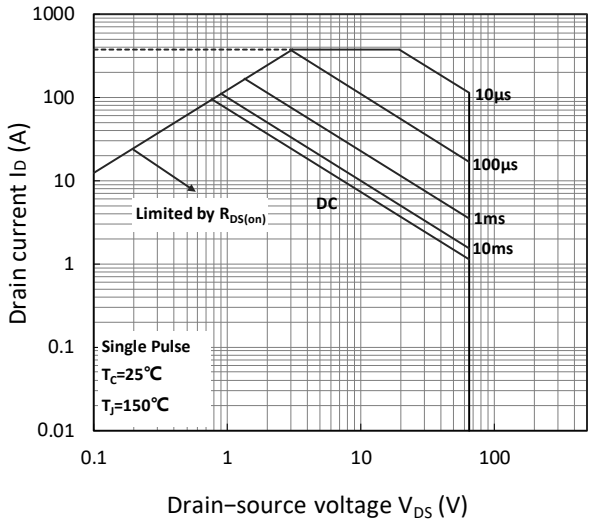



Figure10. Safe Operating Area

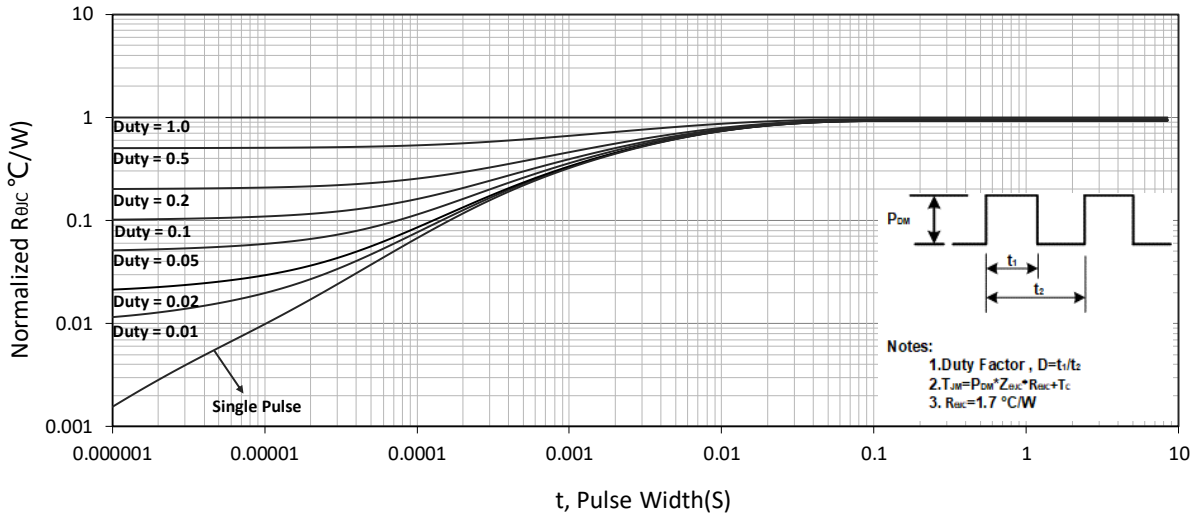



Figure 11. Normalized Maximum Transient Thermal Impedance

## Test Circuit

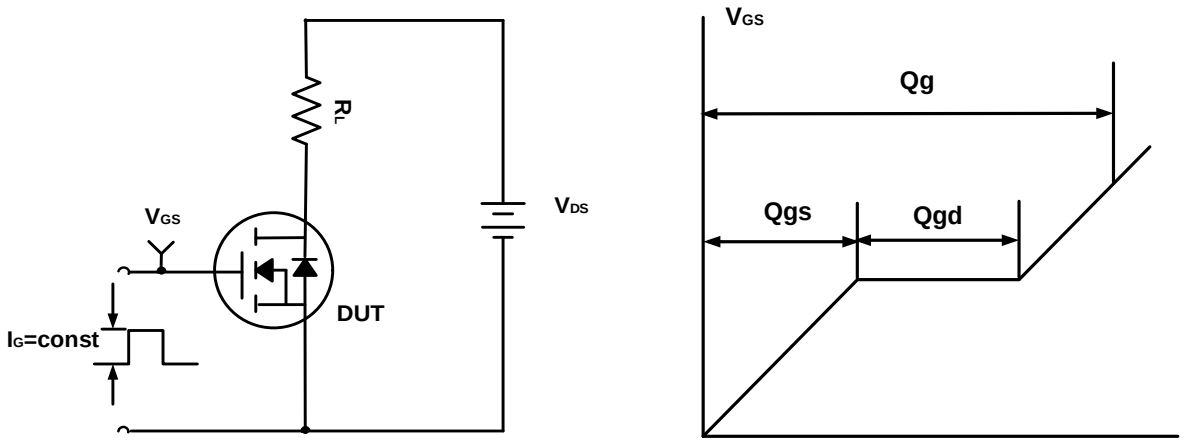



**Figure A. Gate Charge Test Circuit & Waveforms**

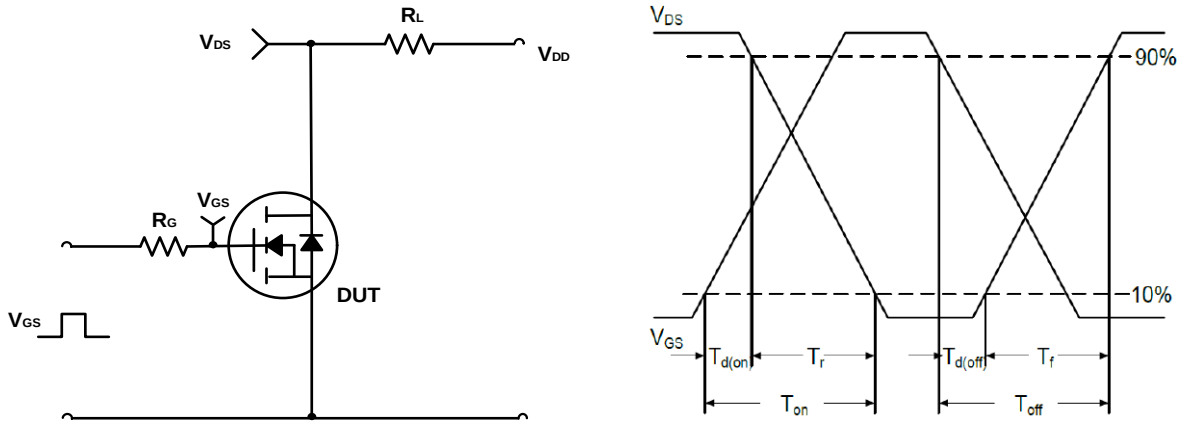



**Figure B. Switching Test Circuit & Waveforms**

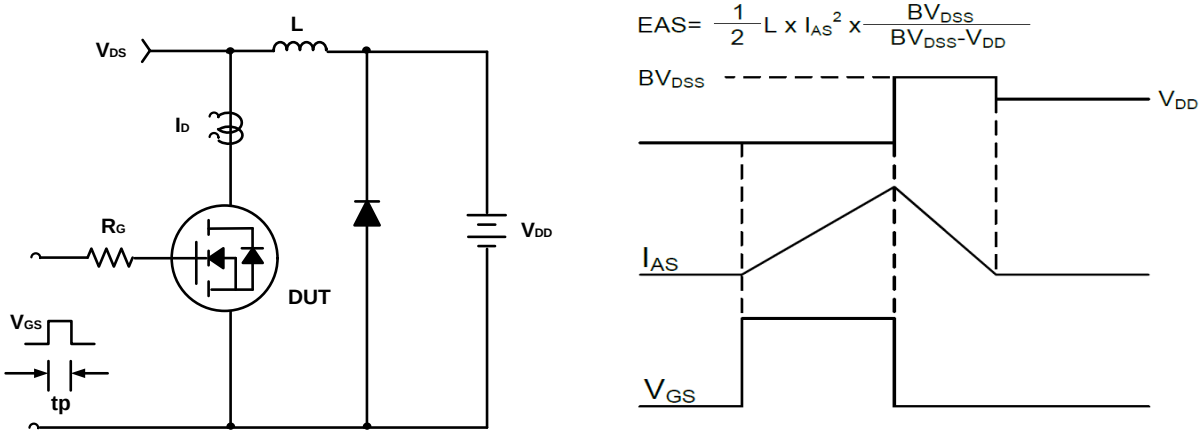
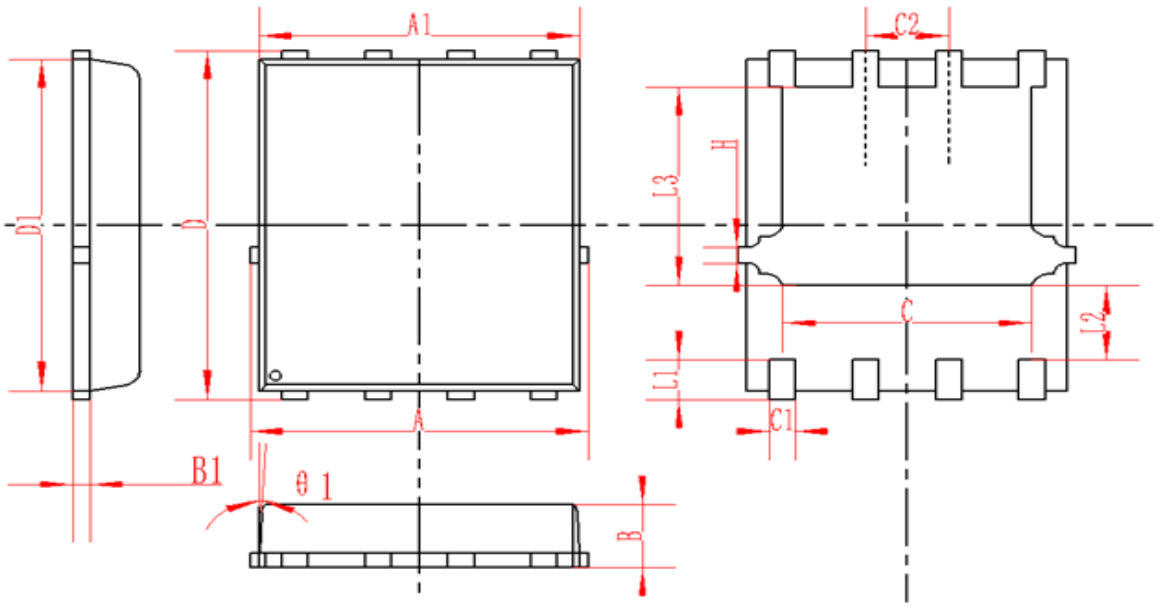



**Figure C. Unclamped Inductive Switching Circuit & Waveforms**

## DFN5X6-8L Package Information




| SYMBOL | MM | | | INCH | | |
|---|---|---|---|---|---|---|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 4.95 | 5 | 5.05 | 0.195 | 0.197 | 0.199 |
| A1 | 4.82 | 4.9 | 4.98 | 0.190 | 0.193 | 0.196 |
| D | 5.98 | 6 | 6.02 | 0.235 | 0.236 | 0.237 |
| D1 | 5.67 | 5.75 | 5.83 | 0.223 | 0.226 | 0.230 |
| B | 0.9 | 0.95 | 1 | 0.035 | 0.037 | 0.039 |
| B1 | 0.254REF | | | 0.010REF | | |
| C | 3.95 | 4 | 4.05 | 0.156 | 0.157 | 0.159 |
| C1 | 0.35 | 0.4 | 0.45 | 0.014 | 0.016 | 0.018 |
| C2 | 1.27TYP | | | 0.5TYP | | |
| θ1 | 8° | 10° | 12° | 8° | 10° | 12° |
| L1 | 0.63 | 0.64 | 0.65 | 0.025 | 0.025 | 0.026 |
| L2 | 1.2 | 1.3 | 1.4 | 0.047 | 0.051 | 0.055 |
| L3 | 3.415 | 3.42 | 3.425 | 0.134 | 0.135 | 0.135 |
| H | 0.24 | 0.25 | 0.26 | 0.009 | 0.010 | 0.010 |

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