
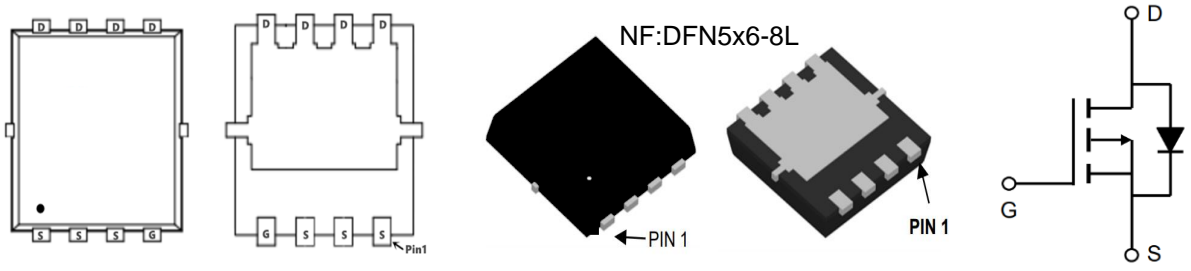




TMP3090NF

P-Channel Enhancement Mosfet

| | |
|--|--|
| <p>General Description</p> <ul style="list-style-type: none"> • Low $R_{DS(ON)}$ • RoHS and Halogen-Free Compliant <p>Applications</p> <ul style="list-style-type: none"> • Load switch • PWM | <p>General Features</p> <p>$V_{DS} = -30V$ $I_D = -90A$ $R_{DS(ON)} = 3.6m\Omega$(typ.) @ $V_{GS} = -10V$</p> <p>100% UIS Tested 100% R_g Tested</p>  |
|--|--|



Marking: 90P03

NF:DFN5x6-8L

PIN 1

PIN 1

G S

Absolute Maximum Ratings ($T_A = 25^\circ C$ Unless Otherwise Noted)

| Parameter | Symbol | Value | Unit |
|--|--------------------------|---------------------|------------|
| Drain-Source Voltage | V_{DS} | -30 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Continuous Drain Current | I_D | $T_C = 25^\circ C$ | -90 |
| | | $T_C = 100^\circ C$ | -57 |
| Pulsed Drain Current ¹ | I_{DM} | -360 | A |
| Single Pulse Avalanche Energy ² | EAS | 125 | mJ |
| Total Power Dissipation | $T_C = 25^\circ C$ P_D | 60 | W |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 to 150 | $^\circ C$ |

Thermal Characteristics

| Parameter | Symbol | Value | Unit |
|--|-----------------|-------|--------------|
| Thermal Resistance from Junction-to-Ambient ³ | $R_{\theta JA}$ | 55 | $^\circ C/W$ |
| Thermal Resistance from Junction-to-Case | $R_{\theta JC}$ | 2.08 | $^\circ C/W$ |

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

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit | |
|--|----------------------------|---|-----------------------|------|------|------|----|
| Static Characteristics | | | | | | | |
| Drain-Source Breakdown Voltage | V_{(BR)DSS} | V _{GS} = 0V, I _D = -250μA | -30 | - | - | V | |
| Gate-body Leakage current | I_{GSS} | V _{DS} = 0V, V _{GS} = ±20V | - | - | ±100 | nA | |
| Zero Gate Voltage Drain Current | I_{DSS} | V _{DS} = -30V, V _{GS} = 0V | T _J =25°C | - | - | -1 | μA |
| | | | T _J =100°C | - | - | -100 | |
| Gate-Threshold Voltage | V_{GS(th)} | V _{DS} = V _{GS} , I _D = -250μA | -1.0 | -1.6 | -2.5 | V | |
| Drain-Source On-Resistance ⁴ | R_{DS(on)} | V _{GS} = -10V, I _D = -30A | - | 3.6 | 5.5 | mΩ | |
| | | V _{GS} = -4.5V, I _D = -15A | - | 5.5 | 6.9 | | |
| Forward Transconductance ⁴ | g_{fs} | V _{DS} = -10V, I _D = -30A | - | 90 | - | S | |
| Dynamic Characteristics⁵ | | | | | | | |
| Input Capacitance | C_{iss} | V _{DS} = -15V, V _{GS} = 0V, f = 1MHz | - | 5070 | - | pF | |
| Output Capacitance | C_{oss} | | - | 695 | - | | |
| Reverse Transfer Capacitance | C_{rss} | | - | 580 | - | | |
| Gate resistance | R_g | f = 1MHz | - | 4 | - | Ω | |
| Switching Characteristics⁵ | | | | | | | |
| Total Gate Charge | Q_g | V _{GS} = -10V, V _{DS} = -15V, I _D = -30A | - | 146 | - | nC | |
| Gate-Source Charge | Q_{gs} | | - | 21.5 | - | | |
| Gate-Drain Charge | Q_{gd} | | - | 39 | - | | |
| Turn-On Delay Time | t_{d(on)} | V _{GS} = -10V, V _{DD} = -15V, R _G = 3Ω, I _D = -30A | - | 23 | - | ns | |
| Rise Time | t_r | | - | 15 | - | | |
| Turn-Off Delay Time | t_{d(off)} | | - | 129 | - | | |
| Fall Time | t_f | | - | 28 | - | | |
| Drain-Source Body Diode Characteristics | | | | | | | |
| Diode Forward Voltage ⁴ | V_{SD} | I _S = -30A, V _{GS} = 0V | - | - | -1.2 | V | |
| Continuous Source Current | I_S | T _C =25°C | - | - | -90 | A | |

Note :

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}= -50A
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.

Typical Characteristics

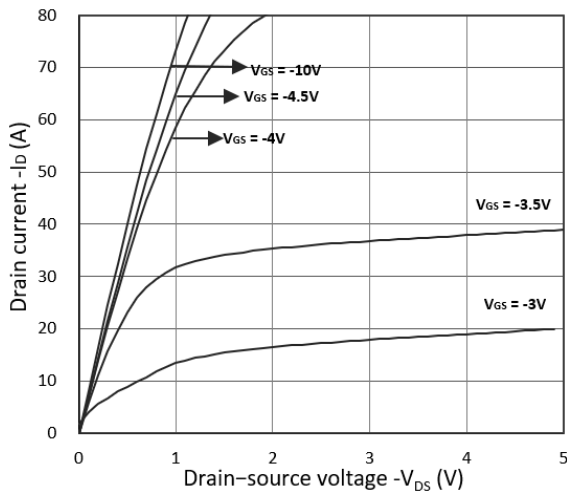


Figure 1. Output Characteristics

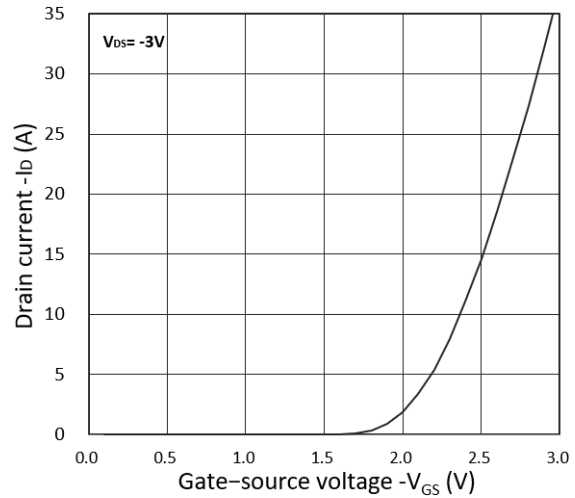


Figure 2. Transfer Characteristics

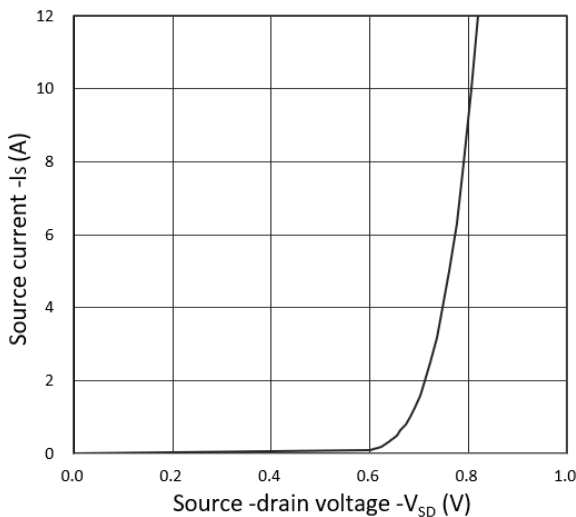


Figure 3. Forward Characteristics of Reverse

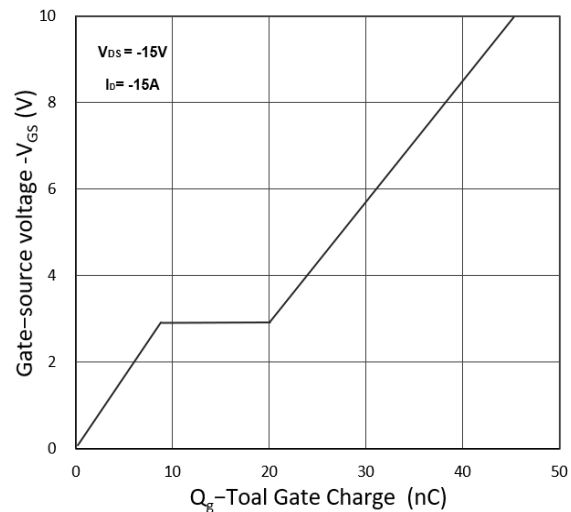


Figure 4. Gate Charge Characteristics

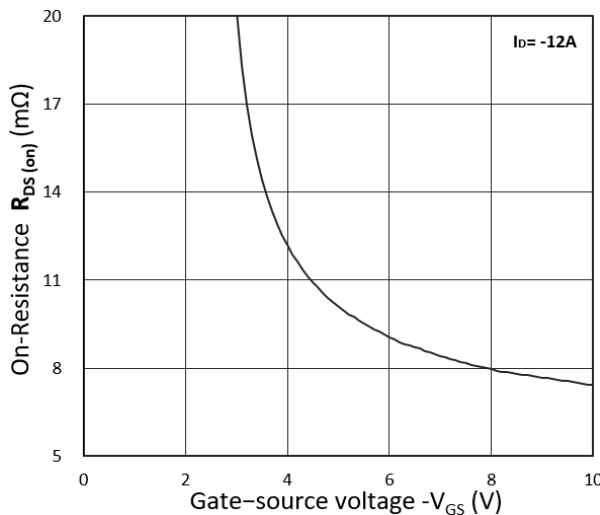


Figure 5. $R_{DS(on)}$ vs. V_{GS}

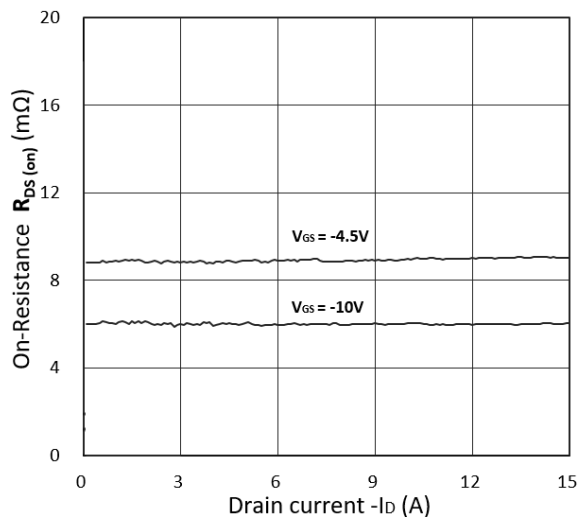


Figure 6. $R_{DS(on)}$ vs. I_D

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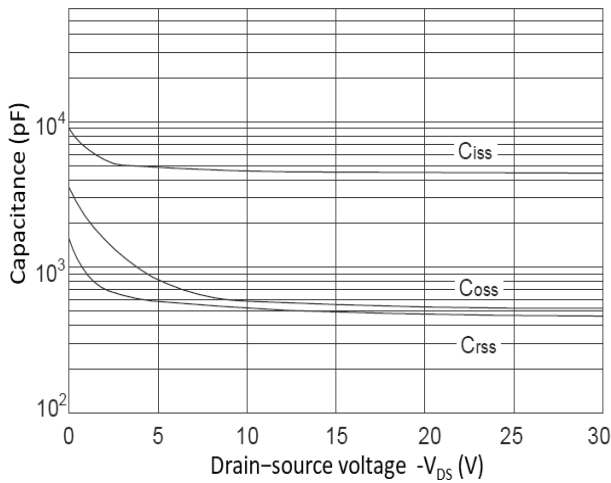


Figure 7. Capacitance Characteristics

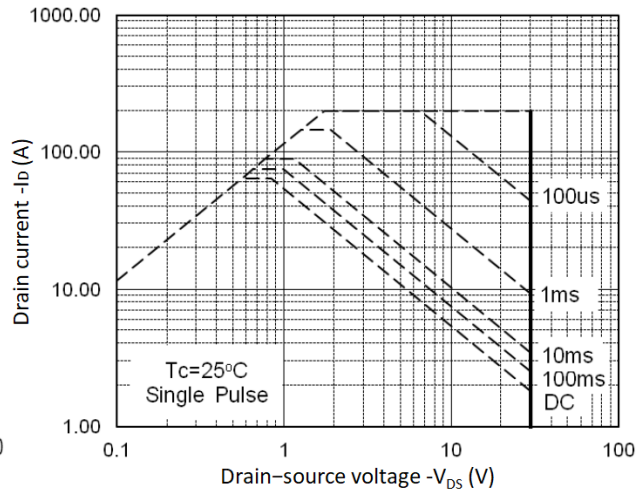


Figure 8. Safe Operating Area

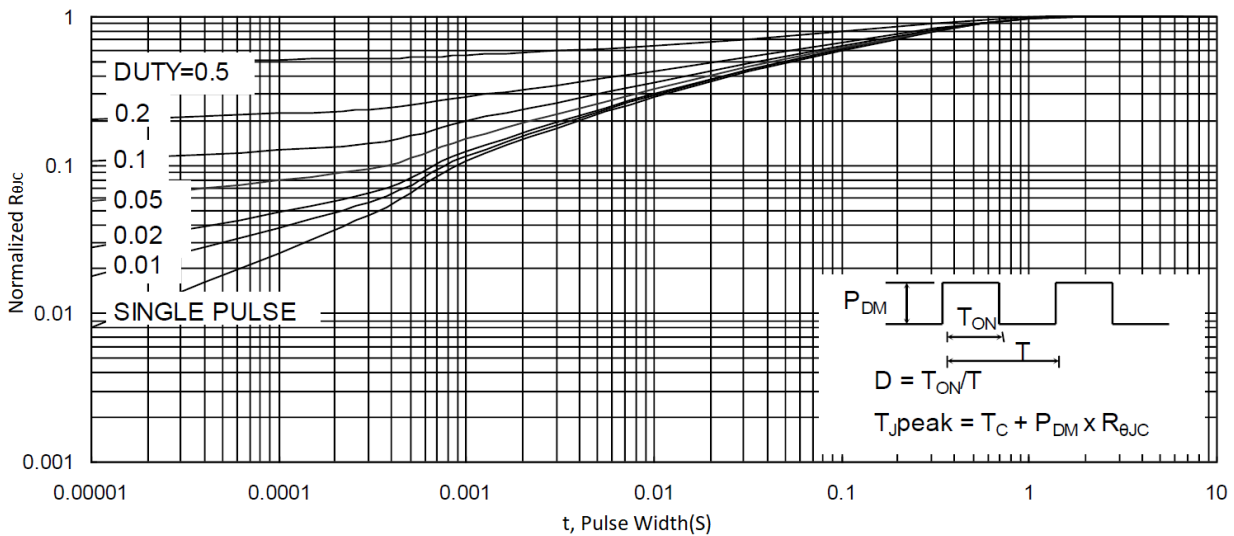


Figure 9. Normalized Maximum Transient Thermal Impedance

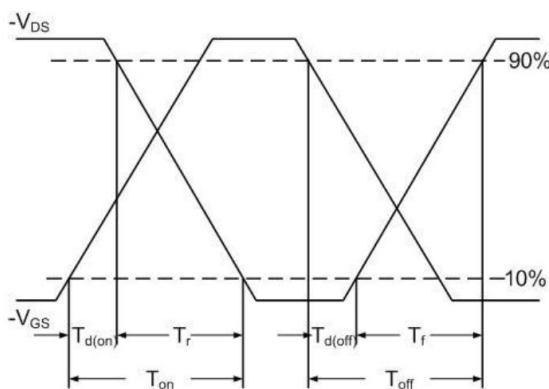


Figure 10. Switching Time Waveform

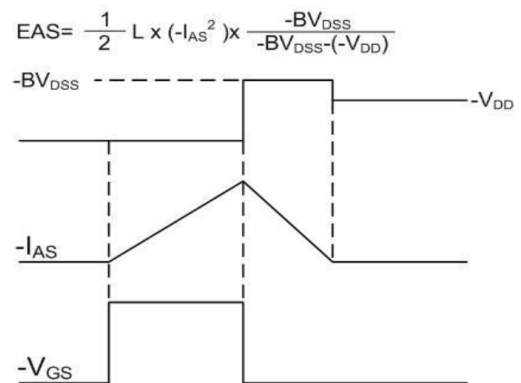


Figure 11. Unclamped Inductive Switching



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Test Circuit

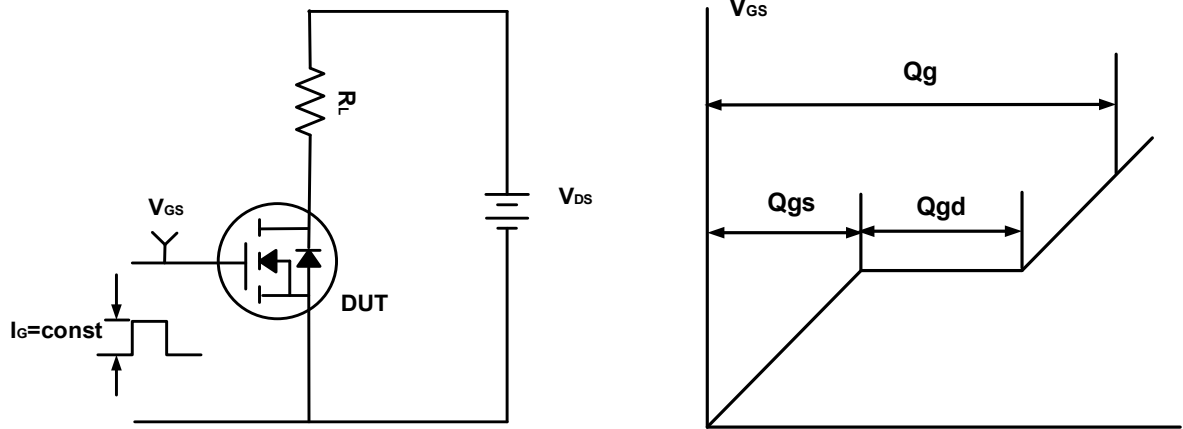


Figure A. Gate Charge Test Circuit & Waveforms

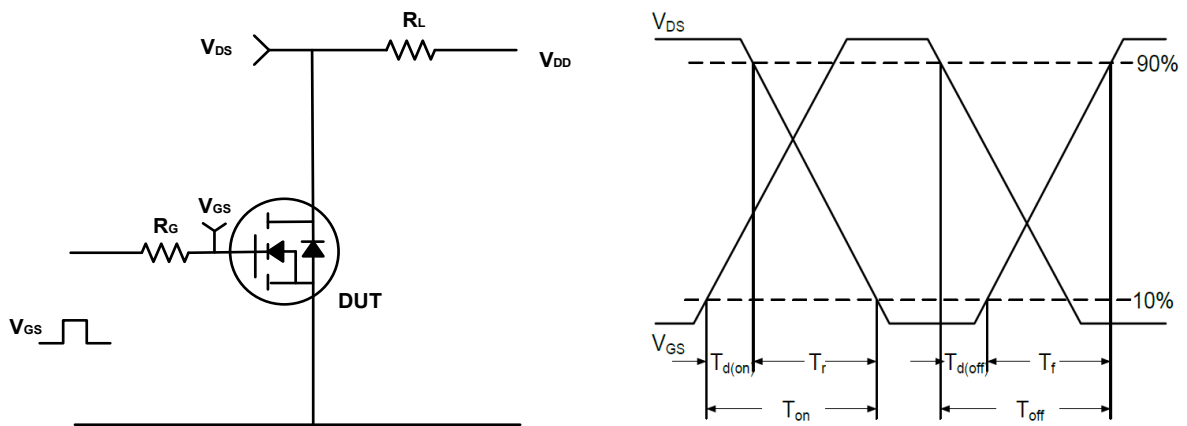


Figure B. Switching Test Circuit & Waveforms

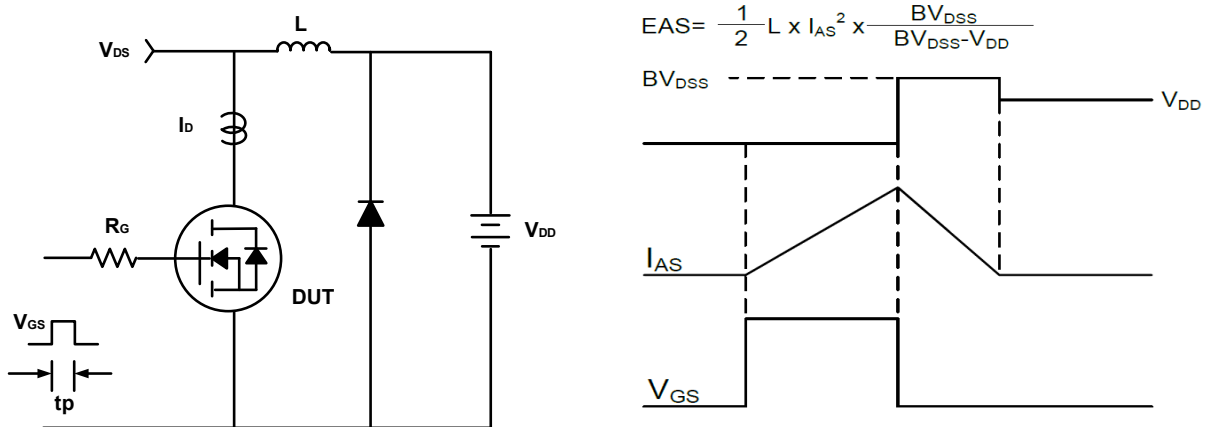
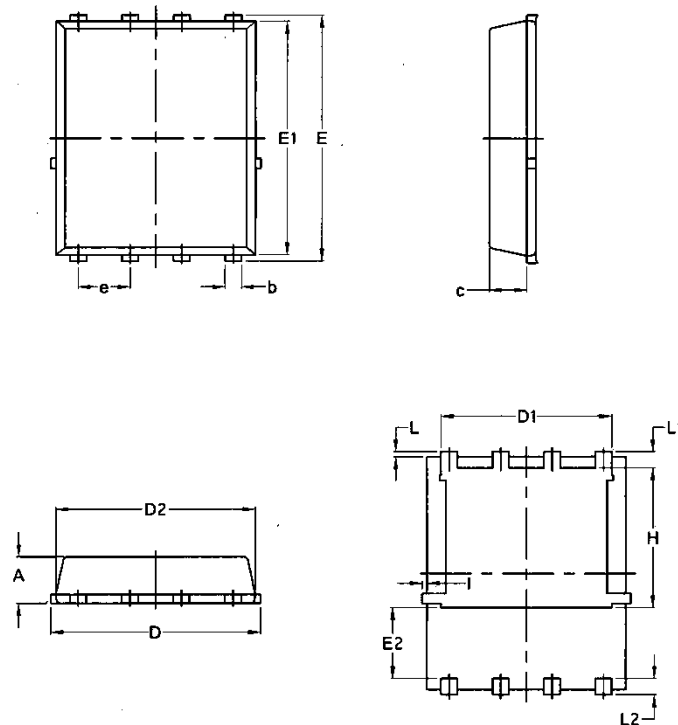


Figure C. Unclamped Inductive Switching Circuit & Waveforms

Package Mechanical Data: DFN5x6-8L



| Symbol | Common | | | |
|--------|----------|--------|----------|--------|
| | mm | | Inch | |
| | Min | Max | Min | Max |
| A | 1.03 | 1.17 | 0.0406 | 0.0461 |
| b | 0.34 | 0.48 | 0.0134 | 0.0189 |
| c | 0.824 | 0.0970 | 0.0324 | 0.082 |
| D | 4.80 | 5.40 | 0.1890 | 0.2126 |
| D1 | 4.11 | 4.31 | 0.1618 | 0.1697 |
| D2 | 4.80 | 5.00 | 0.1890 | 0.1969 |
| E | 5.95 | 6.15 | 0.2343 | 0.2421 |
| E1 | 5.65 | 5.85 | 0.2224 | 0.2303 |
| E2 | 1.60 | / | 0.0630 | / |
| e | 1.27 BSC | | 0.05 BSC | |
| L | 0.05 | 0.25 | 0.0020 | 0.0098 |
| L1 | 0.38 | 0.50 | 0.0150 | 0.0197 |
| L2 | 0.38 | 0.50 | 0.0150 | 0.0197 |
| H | 3.30 | 3.50 | 0.1299 | 0.1378 |
| I | / | 0.18 | / | 0.0070 |

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