



## General Description

The DMT6004LPS-13 use advanced SGT MOSFET technology to provide low  $R_{DS(ON)}$ , low gate charge, fast switching and excellent avalanche characteristics. This device is specially designed to get better ruggedness and suitable.

## General Features

$V_{DS} = 60V$   $I_D = 125A$

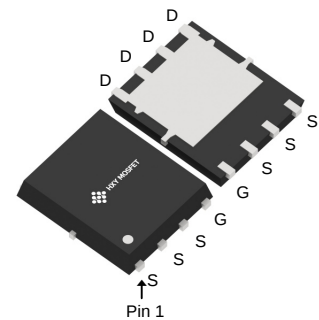
$R_{DS(ON)} < 2.9m\Omega @ V_{GS}=10V$

## Applications

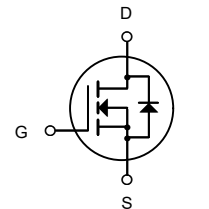
Consumer electronic power supply Motor control

Synchronous-rectification Isolated DC

Synchronous-rectification applications



DFN5X6-8L



N-Channel MOSFET

## Package Marking and Ordering Information

| Product ID    | Pack      | Brand      | Qty(PCS) |
|---------------|-----------|------------|----------|
| DMT6004LPS-13 | DFN5X6-8L | HXY MOSFET | 5000     |

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

| Symbol                  | Parameter                                                | Rating     | Units        |
|-------------------------|----------------------------------------------------------|------------|--------------|
| $V_{DS}$                | Drain-Source Voltage                                     | 60         | V            |
| $V_{GS}$                | Gate-Source Voltage                                      | $\pm 20$   | V            |
| $I_D @ T_c=25^\circ C$  | Continuous Drain Current, $V_{GS} @ 10V$                 | 125        | A            |
| $I_D @ T_c=100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$                 | 101        | A            |
| $I_{DM}$                | Pulsed Drain Current <sup>2</sup>                        | 641        | A            |
| EAS                     | Single Pulse Avalanche Energy <sup>3</sup>               | 189        | mJ           |
| $P_D @ T_c=25^\circ C$  | Total Power Dissipation <sup>4</sup>                     | 113        | W            |
| $T_{STG}$               | Storage Temperature Range                                | -55 to 150 | $^\circ C$   |
| $T_J$                   | Operating Junction Temperature Range                     | -55 to 150 | $^\circ C$   |
| $R_{\theta JC}$         | Thermal Resistance from Junction-to-Ambient <sup>3</sup> | 1.11       | $^\circ C/W$ |
| $R_{\theta JA}$         | Thermal Resistance Junction-Ambient <sup>1</sup>         | 39.4       | $^\circ C/W$ |



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

| Symbol               | Parameter                                                 | Test Condition                                                                          | Min. | Typ.   | Max.   | Units |
|----------------------|-----------------------------------------------------------|-----------------------------------------------------------------------------------------|------|--------|--------|-------|
| V <sub>(BR)DSS</sub> | Drain-Source Breakdown Voltage                            | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                              | 60   | -      | -      | V     |
| I <sub>DSS</sub>     | Zero Gate Voltage Drain Current                           | V <sub>DS</sub> =60V, V <sub>GS</sub> =0V,                                              | -    | -      | 1.0    | μA    |
| I <sub>GSS</sub>     | Gate to Body Leakage Current                              | V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V                                             | -    | -      | ±100   | nA    |
| V <sub>GS(th)</sub>  | Gate Threshold Voltage                                    | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                | 1.2  | 1.6    | 2.2    | V     |
| R <sub>DS(on)</sub>  | Static Drain-Source on-Resistance<br><small>note3</small> | V <sub>GS</sub> =10V, I <sub>D</sub> =20A                                               | -    | 2.4    | 2.9    | mΩ    |
| C <sub>iss</sub>     | Input Capacitance                                         | V <sub>DS</sub> =30V,V <sub>GS</sub> =0V,<br>f=1.0MHz                                   | -    | 4610   | 6915   | pF    |
| C <sub>oss</sub>     | Output Capacitance                                        |                                                                                         | -    | 2188   | 3282   | pF    |
| C <sub>rss</sub>     | Reverse Transfer Capacitance                              |                                                                                         | -    | 66     | 132    | pF    |
| Q <sub>g</sub>       | Total Gate Charge                                         | V <sub>DS</sub> =30V, I <sub>D</sub> =40A,<br>V <sub>GS</sub> =10V                      | -    | 74.37  | 111.56 | nC    |
| Q <sub>gs</sub>      | Gate-Source Charge                                        |                                                                                         | -    | 17.26  | -      | nC    |
| Q <sub>gd</sub>      | Gate-Drain(“Miller”) Charge                               |                                                                                         | -    | 9.44   | 18.88  | nC    |
| t <sub>d(on)</sub>   | Turn-on Delay Time                                        | V <sub>DD</sub> =30V, I <sub>D</sub> =40A,<br>R <sub>G</sub> =2.7Ω,V <sub>GS</sub> =10V | -    | 14.13  | -      | ns    |
| t <sub>r</sub>       | Turn-on Rise Time                                         |                                                                                         | -    | 63.73  | -      | ns    |
| t <sub>d(off)</sub>  | Turn-off Delay Time                                       |                                                                                         | -    | 46.8   | -      | ns    |
| t <sub>f</sub>       | Turn-off Fall Time                                        |                                                                                         | -    | 105.07 | -      | ns    |
| I <sub>S</sub>       | Maximum Continuous Drain to Source Diode Forward Current  |                                                                                         | -    | -      | 125    | A     |
| I <sub>SM</sub>      | Maximum Pulsed Drain to Source Diode Forward Current      |                                                                                         | -    | -      | 641    | A     |
| V <sub>SD</sub>      | Drain to Source Diode Forward Voltage                     | V <sub>GS</sub> =0V, I <sub>S</sub> =40A                                                | -    | -      | 1.2    | V     |
| t <sub>rr</sub>      | Body Diode Reverse Recovery Time                          | T <sub>J</sub> =25°C,<br>I <sub>F</sub> =40A,dI/dt=100A/μs                              | -    | 52.78  | 105.56 | ns    |
| Q <sub>rr</sub>      | Body Diode Reverse Recovery Charge                        |                                                                                         | -    | 56.31  | 112.62 | nC    |

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition:  $T_J=25^{\circ}\text{C}$ ,  $V_{DD}=30V$ ,  $V_G=10V$ ,  $R_G=25\Omega$ ,  $L=0.5mH$ ,  $I_{AS}=12A$

3. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 0.5\%$



## Typical Characteristics

Fig 1: Output Characteristics

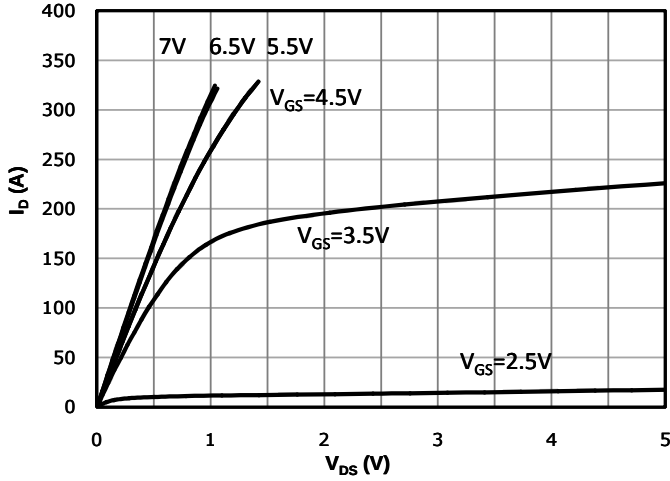


Fig 2: Transfer Characteristics

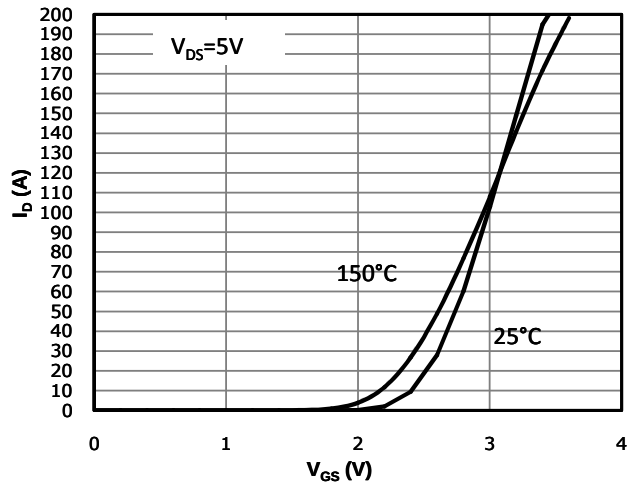


Fig 3:  $R_{DS(on)}$  vs Drain Current and Gate Voltage

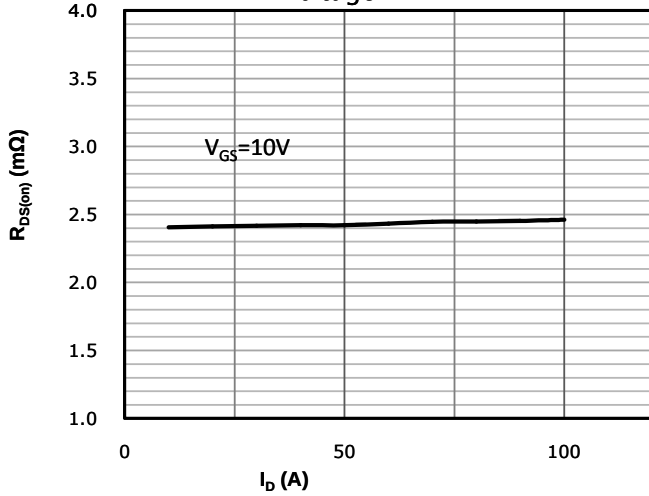


Fig 4:  $R_{DS(on)}$  vs Gate Voltage

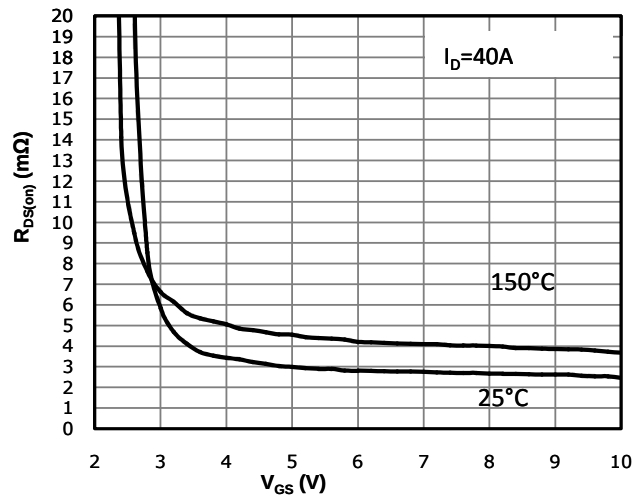


Fig 5:  $R_{DS(on)}$  vs. Temperature

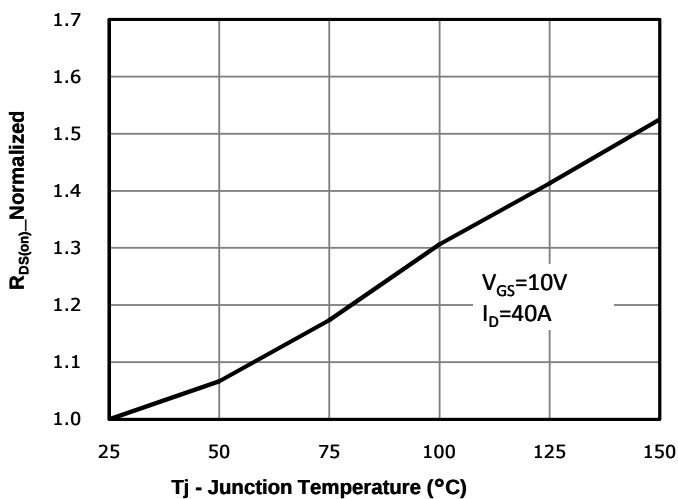


Fig 6: Capacitance Characteristics

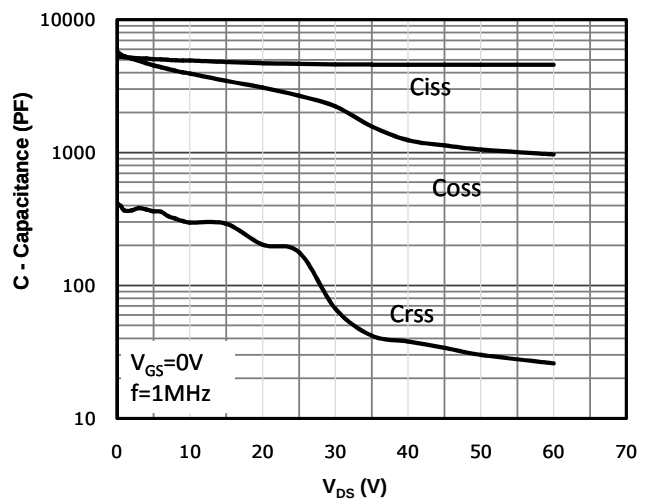




Fig 7: Gate Charge Characteristics

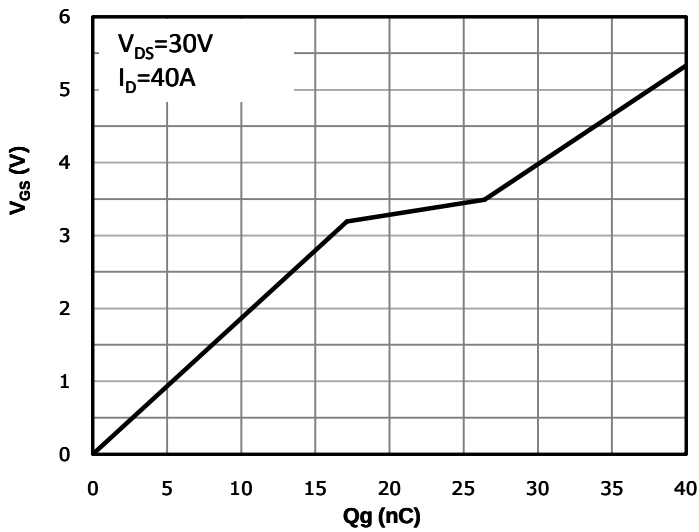


Fig 8: Body-diode Forward Characteristics

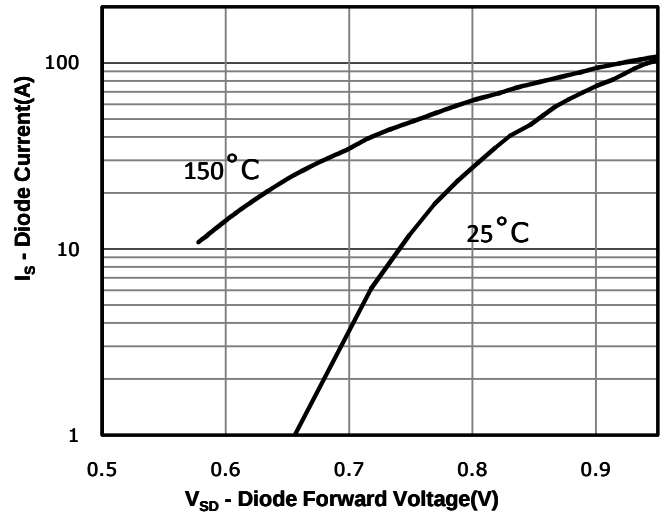


Fig 9: Power Dissipation

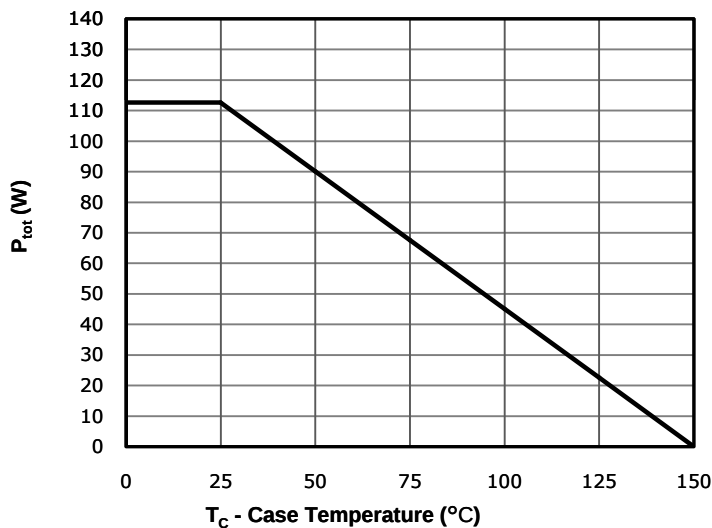


Fig 10: Drain Current Derating

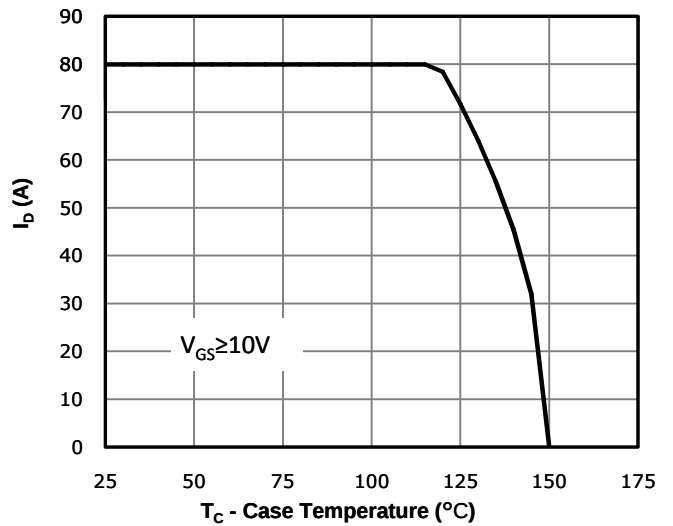


Fig 11: Safe Operating Area

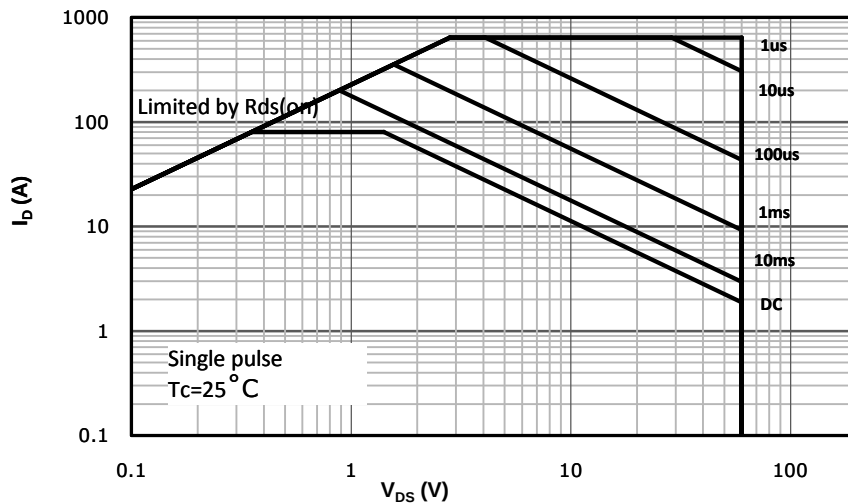
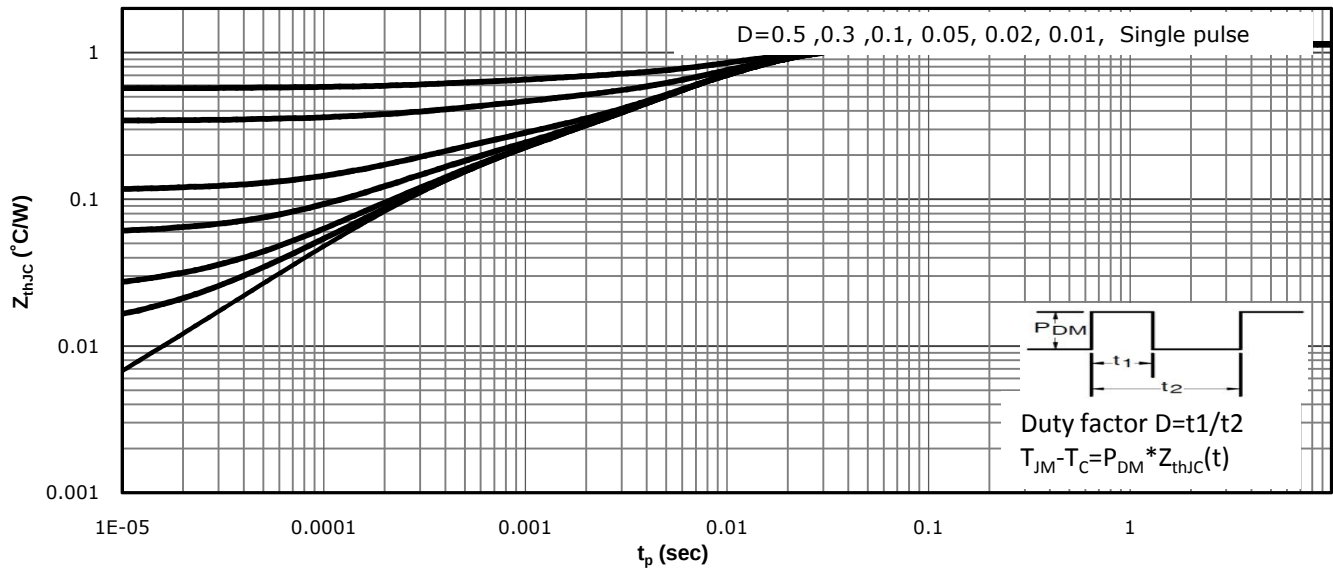


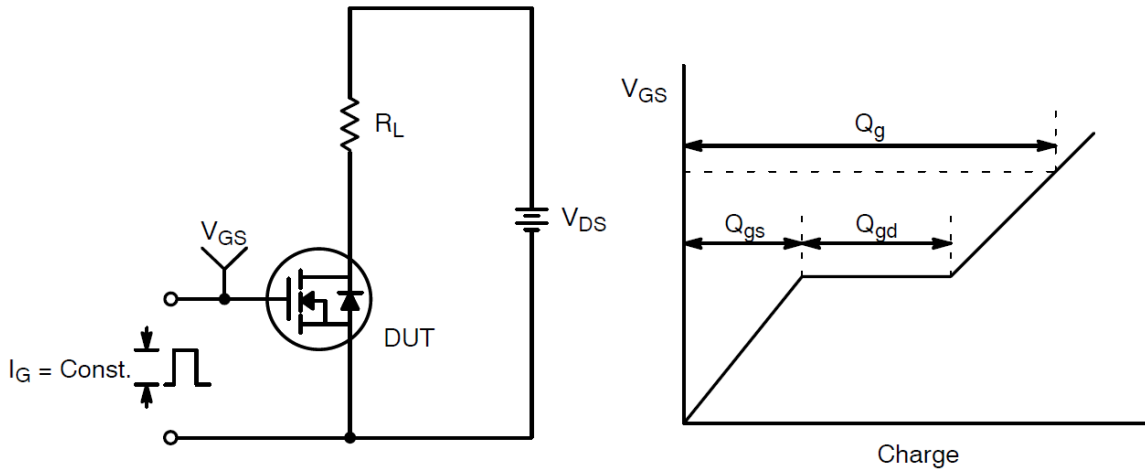


Fig 12: Max. Transient Thermal Impedance

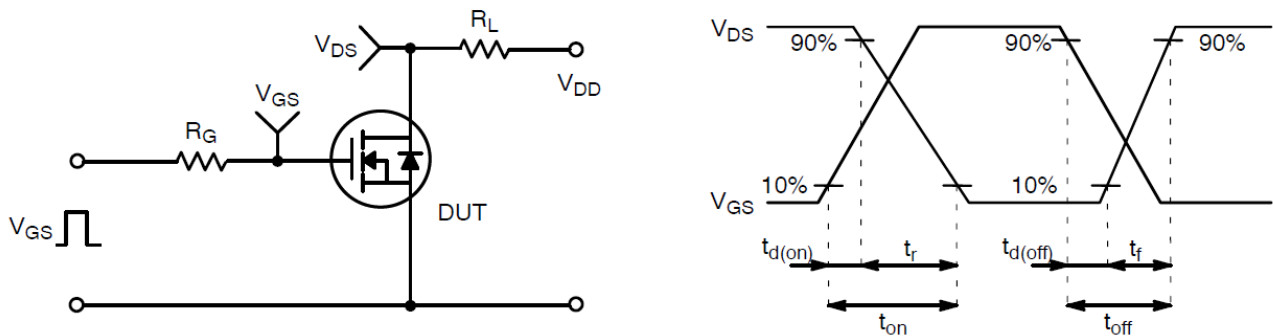




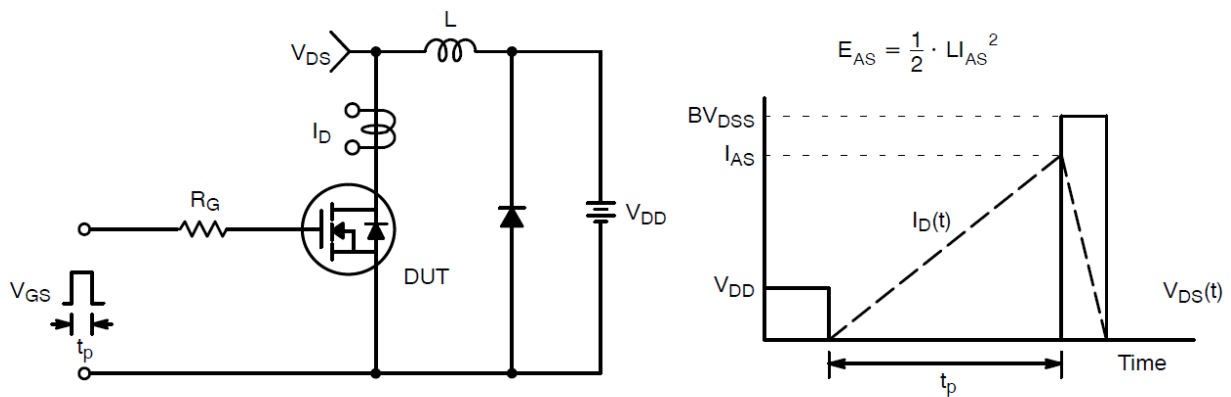
### Test Circuit and Waveform:



Gate Charge Test Circuit & Waveform



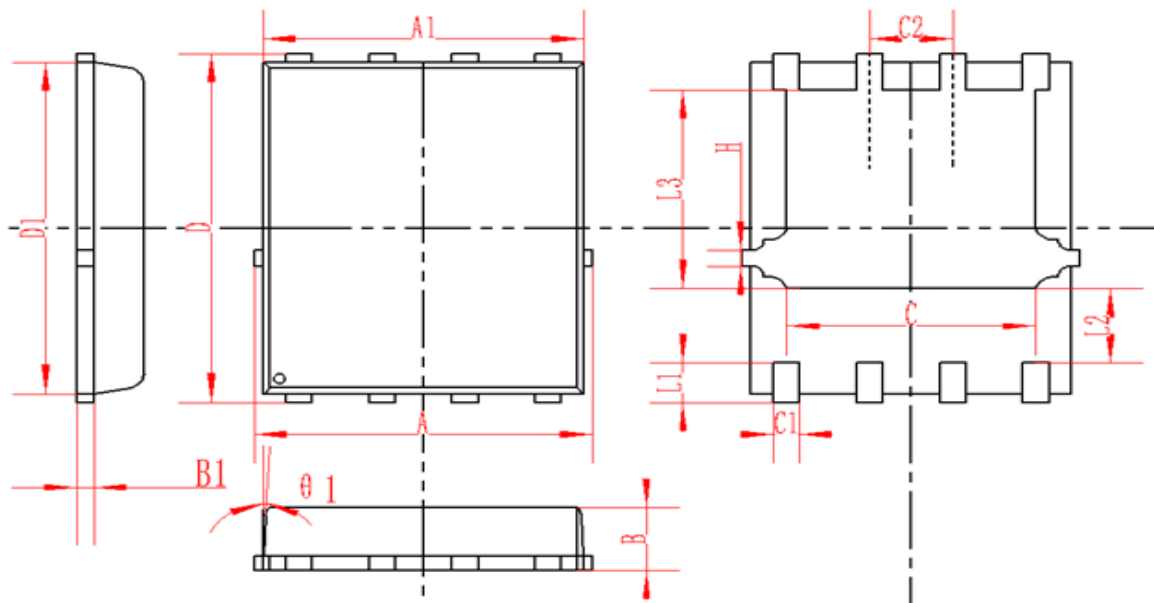
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test 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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