

### Features

- Dual-side cooled package with lowest junction-top thermal resistance
- Uses advanced SGT technology
- Extremely low on-resistance  $R_{DS(on)}$
- Excellent gate charge x  $R_{DS(on)}$  product(FOM)

### Mechanical Data

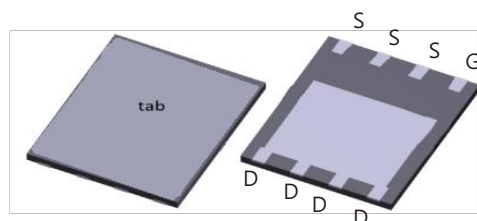
- Case:DFN5×6 Package

### Application

- Switching Application
- SR (Synchronous rectification)
- DC/DC converter
- Automotive applications

| Product Summary |                                |           |             |
|-----------------|--------------------------------|-----------|-------------|
| $V_{DS}$        | $R_{DS(on)}$ (m $\Omega$ ) Typ | $I_D$ (A) | $Q_g$ (Typ) |
| 85V             | 1.5 @ 10V 30A                  | 243       | 104nc       |

DFN5×6  
DS015N085GT3



### Ordering Information

| Part No.   | Marking.   | Package Type | Package     | Quality(box) |
|------------|------------|--------------|-------------|--------------|
| DS044N06GT | DS044N06GT | DFN5×6       | Tape & Reel | 5000         |

### Block Diagram

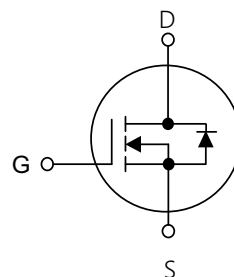


Table1 Absolute Maximum Ratings ( $T_c=25^\circ\text{C}$ , unless otherwise specified)

| Parameter                                  |                         | Symbol        | Value    | Unit             |
|--------------------------------------------|-------------------------|---------------|----------|------------------|
| Drain-Source Voltage                       |                         | $V_{DS}$      | 85       | V                |
| Gate-Source Voltage                        |                         | $V_{GS}$      | $\pm 20$ | V                |
| Continuous (Note 5)<br>Drain Current       | $T_c=25^\circ\text{C}$  | $I_D$         | 243      | A                |
|                                            | $T_c=100^\circ\text{C}$ |               | 154      |                  |
| Pulsed Drain Current (Note 1)              |                         | $I_{DM}$      | 920      | A                |
| Single Pulse Avalanche Energy(Note 2)      |                         | $E_{AS}$      | 1406     | mJ               |
| Power Dissipation $T_c=25^\circ\text{C}$   |                         | $P_D$         | 181      | W                |
| Operating Junction and Storage Temperature |                         | $T_J/T_{STG}$ | -55~+150 | $^\circ\text{C}$ |

Table 2. Thermal Characteristics

| Parameter                                   | Symbol          | Value | Unit                        |
|---------------------------------------------|-----------------|-------|-----------------------------|
| Thermal resistance Junction to Ambient      | $R_{\theta JA}$ | 90    | $^{\circ}\text{C}/\text{W}$ |
| Thermal resistance Junction to Case, bottom | $R_{\theta JC}$ | 0.69  | $^{\circ}\text{C}/\text{W}$ |
| Thermal resistance Junction to Case, top    | $R_{\theta JC}$ | 0.72  | $^{\circ}\text{C}/\text{W}$ |

Table 3. Electrical Characteristics ( $T_J=25^{\circ}\text{C}$ , unless otherwise specified)

| Parameter                                              | Symbol               | Test Conditions                                                         | Min | Typ  | Max  | Unit |
|--------------------------------------------------------|----------------------|-------------------------------------------------------------------------|-----|------|------|------|
| Off Characteristics                                    |                      |                                                                         |     |      |      |      |
| Drain-Source Breakdown Voltage                         | BV <sub>DSS</sub>    | V <sub>GS</sub> =0V,I <sub>D</sub> =250μA                               | 85  | -    | -    | V    |
| Drain-Source Leakage Current                           | I <sub>DSS</sub>     | V <sub>DS</sub> =85V,V <sub>GS</sub> =0V, T <sub>J</sub> =25°C          | -   | -    | 1    | μA   |
|                                                        |                      | V <sub>DS</sub> =85V,V <sub>GS</sub> =0V, T <sub>J</sub> =150°C         | -   | -    | 100  |      |
| Gate- Source Leakage Current                           | I <sub>GSS</sub>     | V <sub>GS</sub> =±20V,V <sub>DS</sub> =0V                               | -   | -    | ±100 | nA   |
| On Characteristics(Note 3)                             |                      |                                                                         |     |      |      |      |
| Gate Threshold Voltage                                 | V <sub>GS(TH)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> ,I <sub>D</sub> =250μA                 | 2.0 | -    | 4.0  | V    |
| Static Drain-Source On-State Resistance                | R <sub>DS(ON)</sub>  | V <sub>GS</sub> =10V,I <sub>D</sub> =30A                                | -   | 1.5  | 1.8  | mΩ   |
| Dynamic Characteristics(Note 4)                        |                      |                                                                         |     |      |      |      |
| Input Capacitance                                      | C <sub>ISS</sub>     | V <sub>DS</sub> =40V,V <sub>GS</sub> =0V,f=1MHz                         | -   | 7732 | -    | pF   |
| Output Capacitance                                     | C <sub>OSS</sub>     |                                                                         | -   | 3233 | -    | pF   |
| Reverse Transfer Capacitance                           | C <sub>RSS</sub>     |                                                                         | -   | 212  | -    | pF   |
| Gate Resisance                                         | R <sub>G</sub>       | f=1MHz                                                                  | -   | 2.0  | -    | Ω    |
| Switching Characteristics (Note 4)                     |                      |                                                                         |     |      |      |      |
| Turn-On Delay Time                                     | t <sub>d</sub> (on)  | V <sub>DS</sub> =40V,R <sub>G</sub> =3Ω<br>V <sub>GS</sub> =10V         | -   | 18   | -    | ns   |
| Turn-On Rise Time                                      | t <sub>R</sub>       |                                                                         | -   | 10   | -    | ns   |
| Turn-Off Delay Time                                    | t <sub>d</sub> (off) |                                                                         | -   | 30   | -    | ns   |
| Turn-Off Fall Time                                     | t <sub>f</sub>       |                                                                         | -   | 12   | -    | ns   |
| Total Gate Charge                                      | Q <sub>G</sub>       | V <sub>DS</sub> =40V,I <sub>D</sub> =80A,<br>V <sub>GS</sub> =10V       | -   | 104  | -    | nC   |
| Gate-Source Charge                                     | Q <sub>GS</sub>      |                                                                         | -   | 37   | -    | nC   |
| Gate-Drain Charge                                      | Q <sub>GD</sub>      |                                                                         | -   | 19   | -    | nC   |
| Drain-Source Diode Characteristics and Maximum Ratings |                      |                                                                         |     |      |      |      |
| Drain-Source Diode Forward Voltage                     | V <sub>SD</sub>      | V <sub>GS</sub> =0V, I <sub>S</sub> =30A                                | -   | -    | 1.4  | V    |
| Maximum Continuous Drain-Source Diode Forward Current  | I <sub>S</sub>       |                                                                         | -   | -    | 243  | A    |
| Reverse Recovery Time                                  | t <sub>rr</sub>      | V <sub>GS</sub> =0V, I <sub>F</sub> =30A<br>dI <sub>F</sub> /dt=100A/μs | -   | 50   | -    | ns   |
| Reverse Recovery Charge                                | Q <sub>RR</sub>      |                                                                         | -   | 75   | -    | nC   |

Notes : 1 Repetitive Rating:Pulse width limited by maximum junction temperature

2  $L=0.3\text{mH}$ ,  $R_G=25\Omega$ , Starting  $T_J=25^{\circ}\text{C}$

3 Pulse Test: Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$

4 Guaranteed by design, not subject to production

5 The maximum current is limited by the package.

## Typical Characteristics Diagrams

Figure 1. Output Characteristics

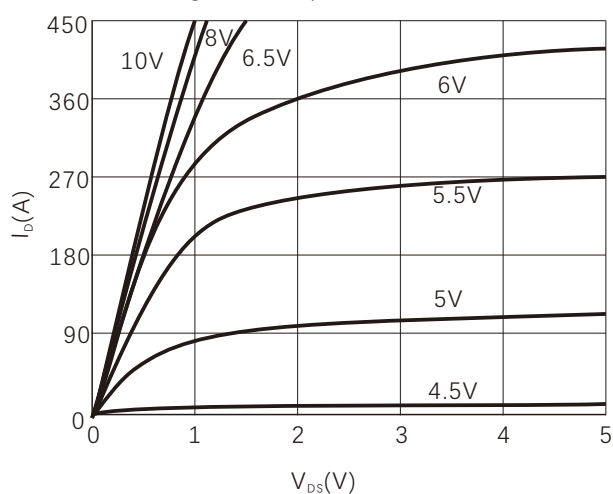


Figure 2. Normalized  $R_{DS(on)}$  vs Temperature

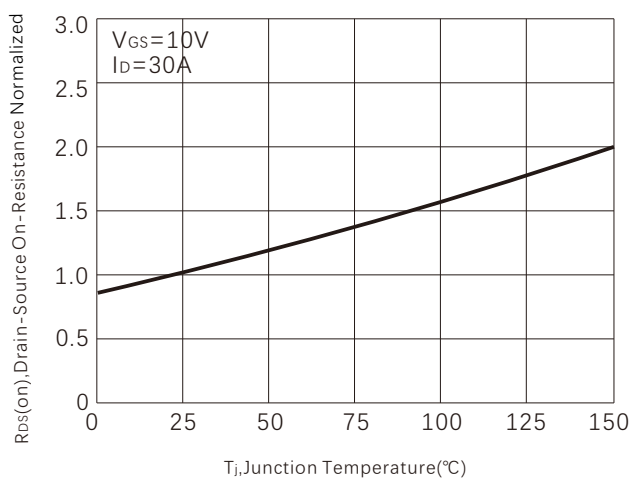


Figure 3. On-Resistance vs. Drain Current

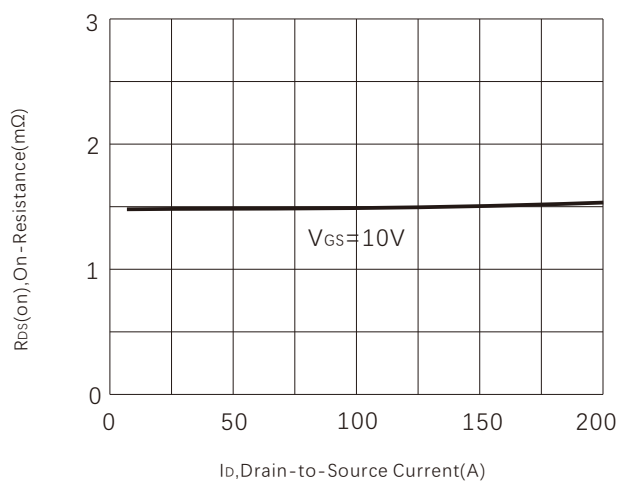


Figure 4. Capacitance

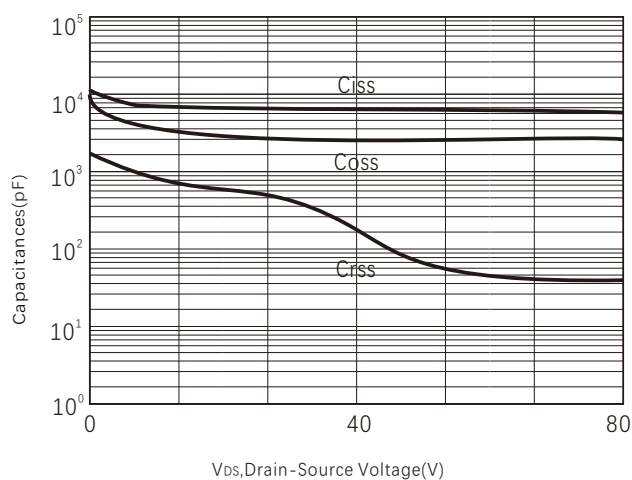


Figure 5. Gate charge

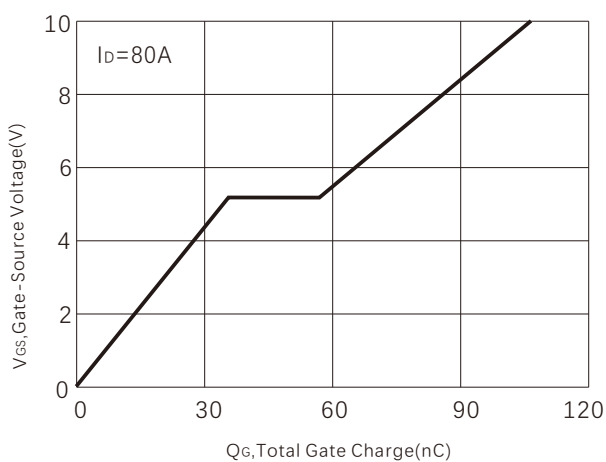


Figure 6. Transfer Characteristics

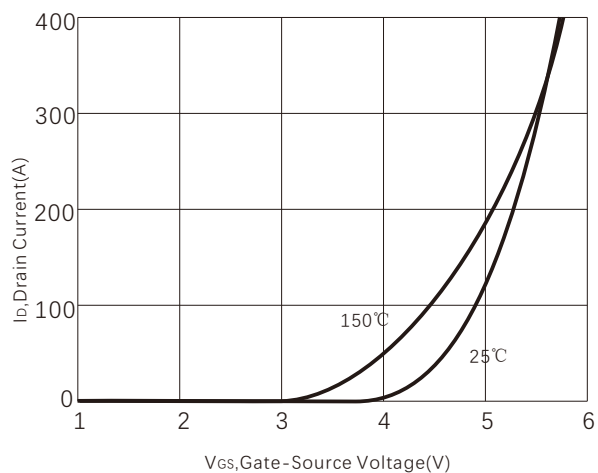


Figure7.Maximum Drain Current vs Temperature

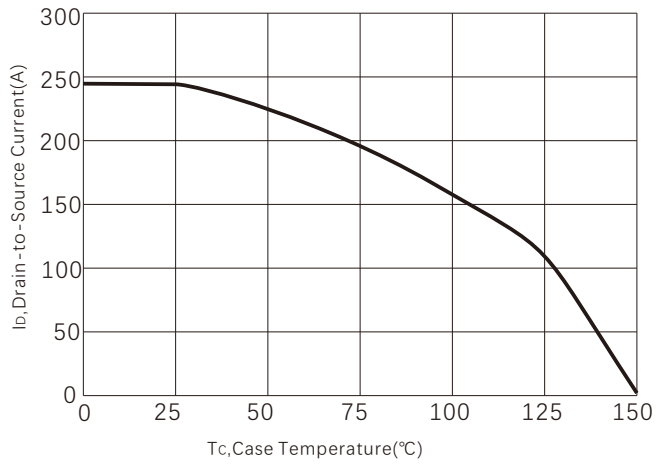


Figure 8. Power dissipation

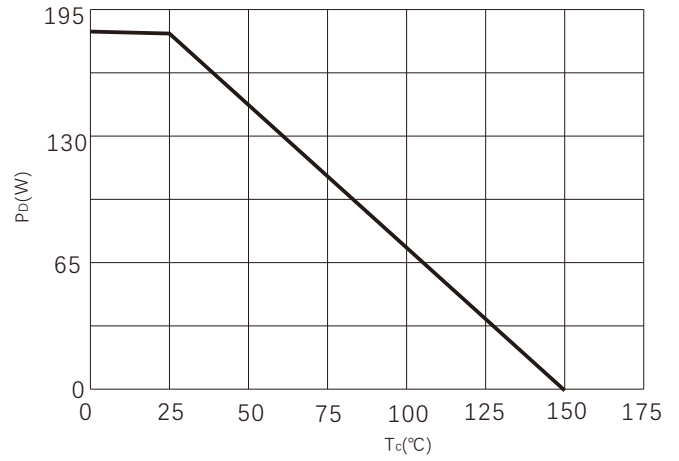


Figure 9.

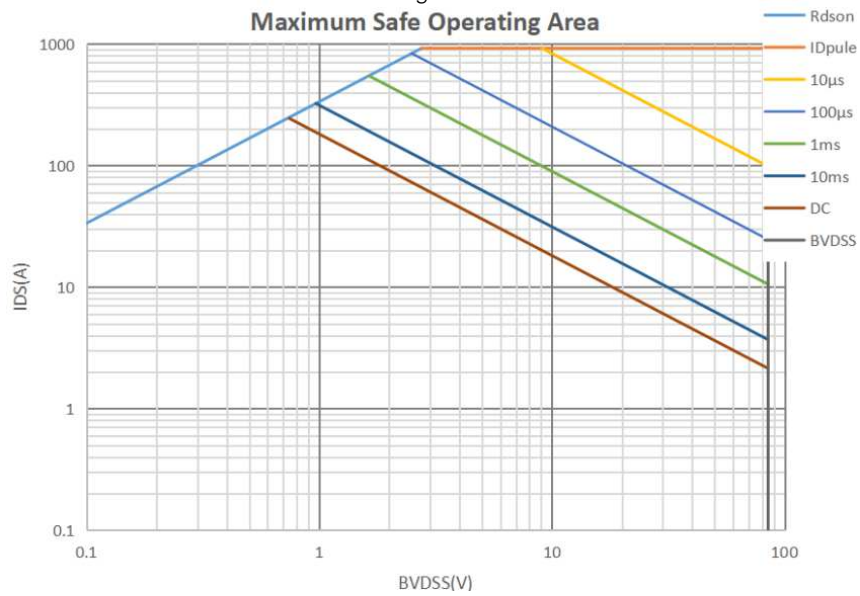
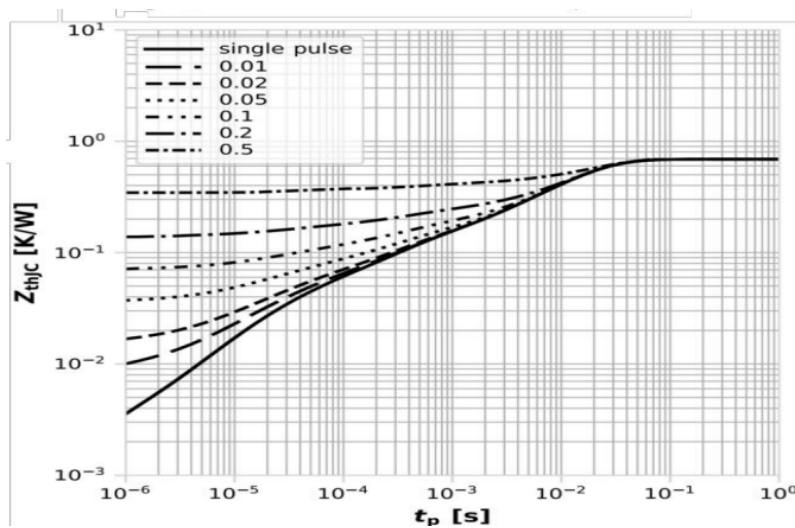
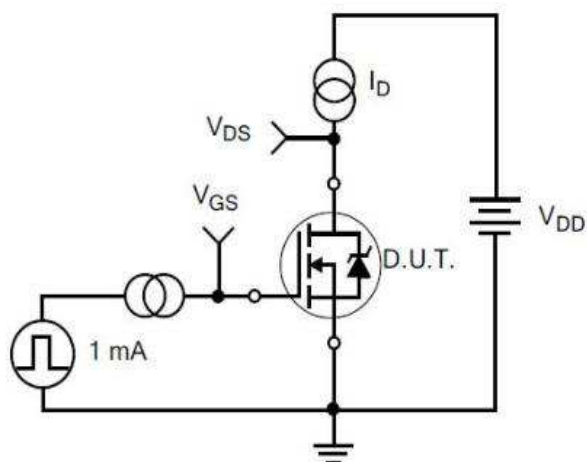


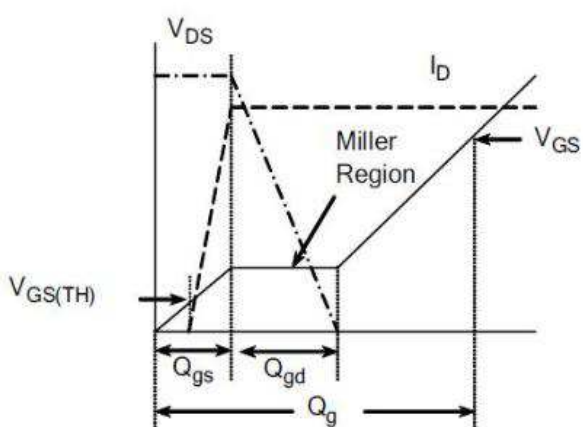
Figure 10.Maximum Transient Thermal Impedance



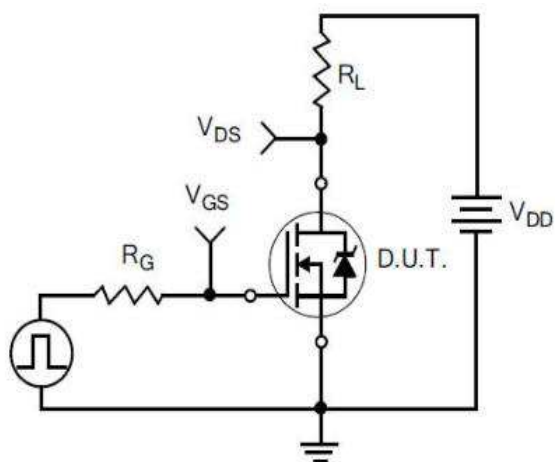
## Typical Test Circuit



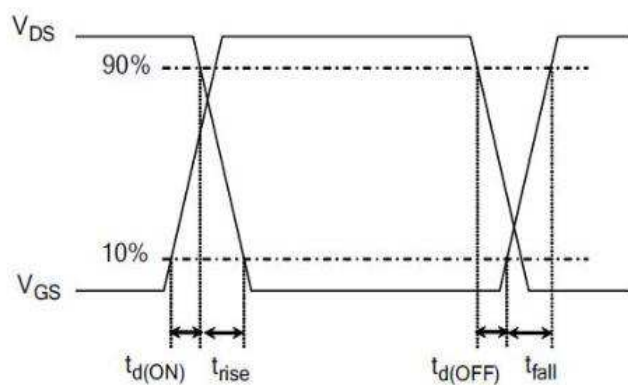
1) Gate Charge Test Circuit



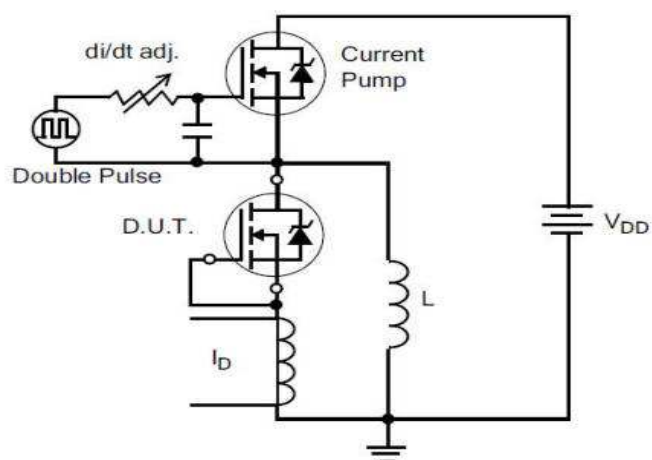
2) Gate Charge Waveform



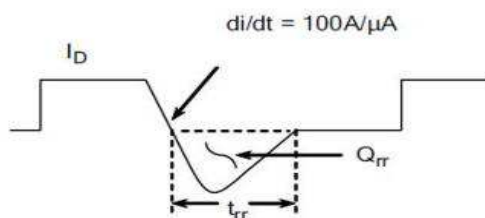
3) Resistive Switching Test Circuit



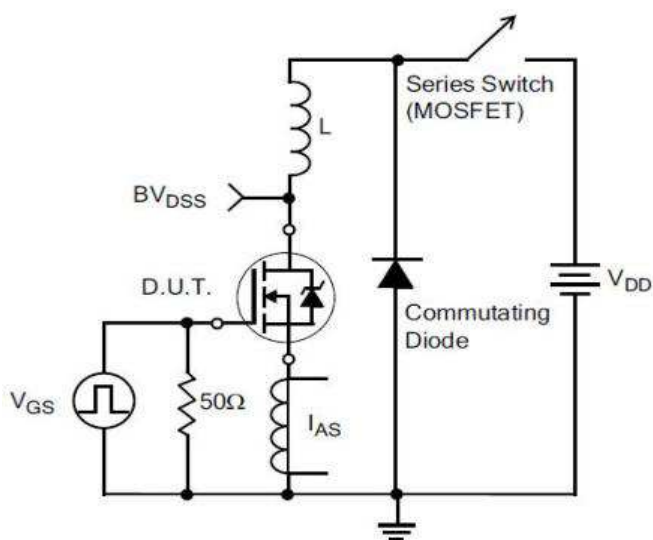
4) Resistive Switching Waveforms



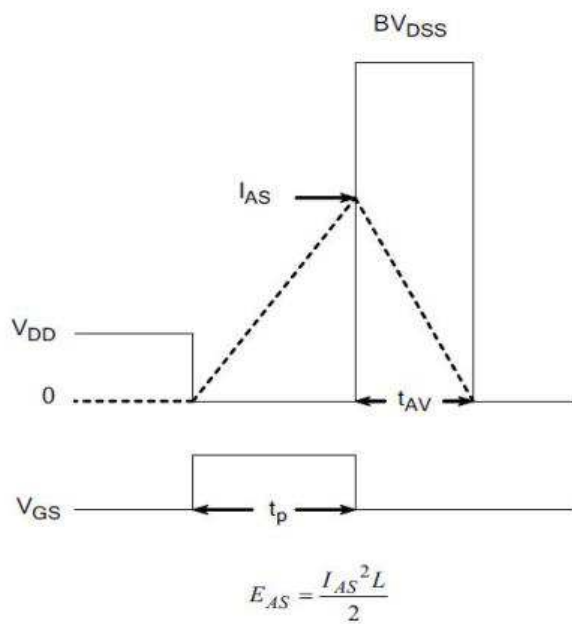
### 5) Diode Reverse Recovery Test Circuit



### 6) Diode Reverse Recovery Waveform

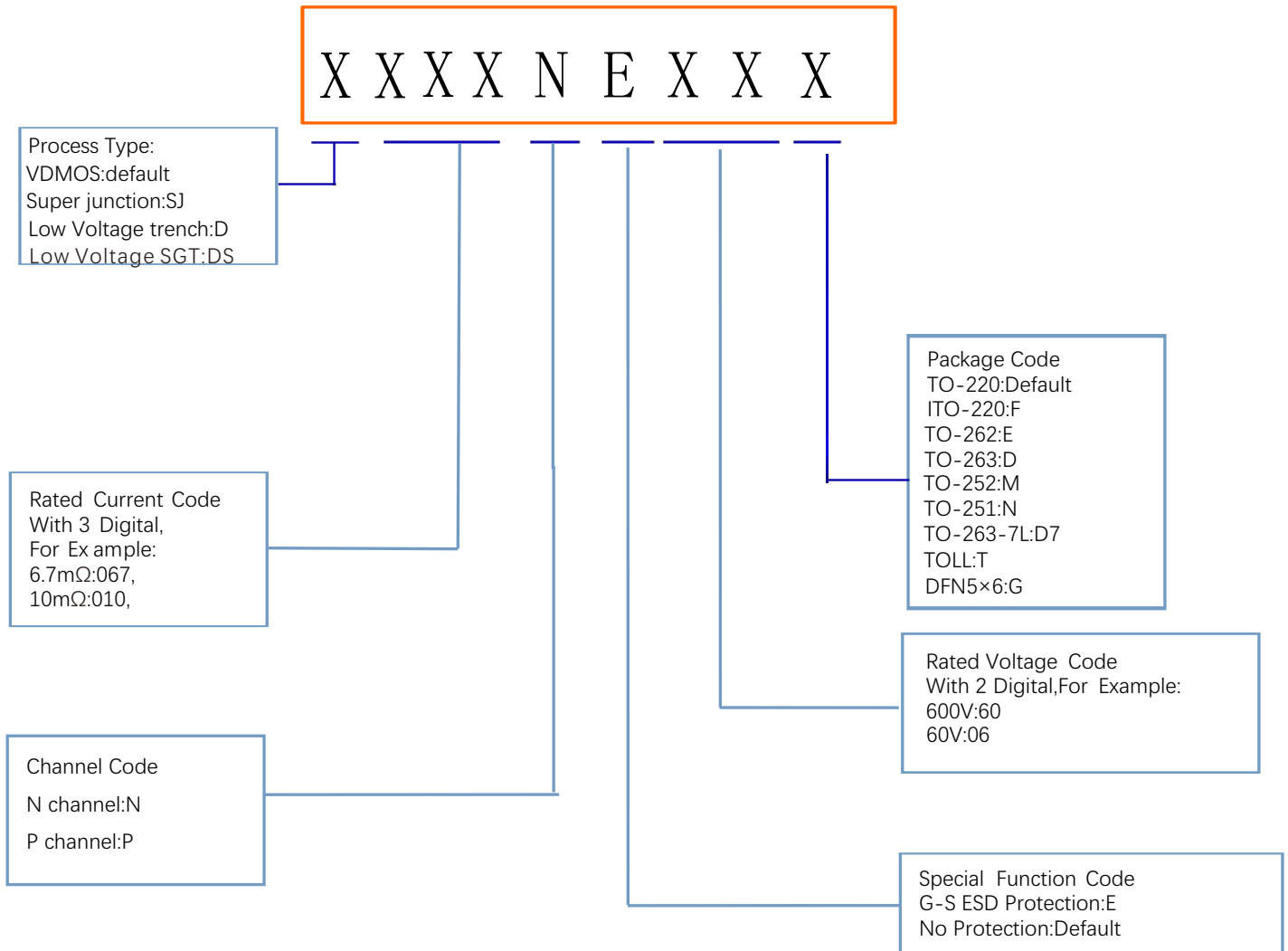


### 7) . Unclamped Inductive Switching Test Circuit

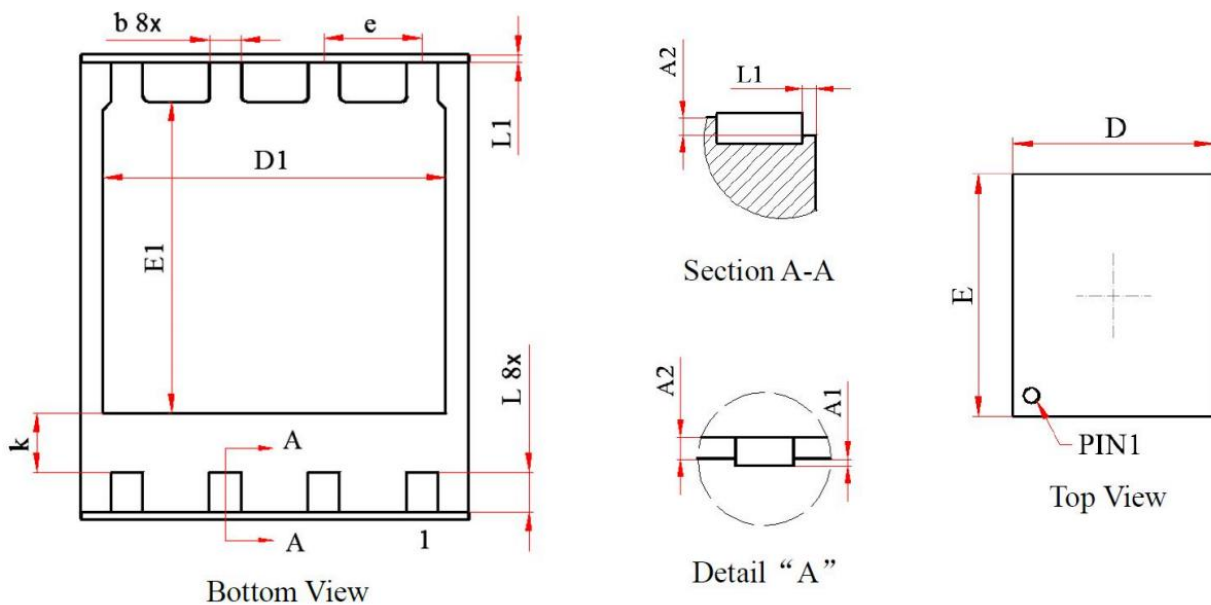


### 8) Unclamped Inductive Switching Waveforms

## Product Names Rules

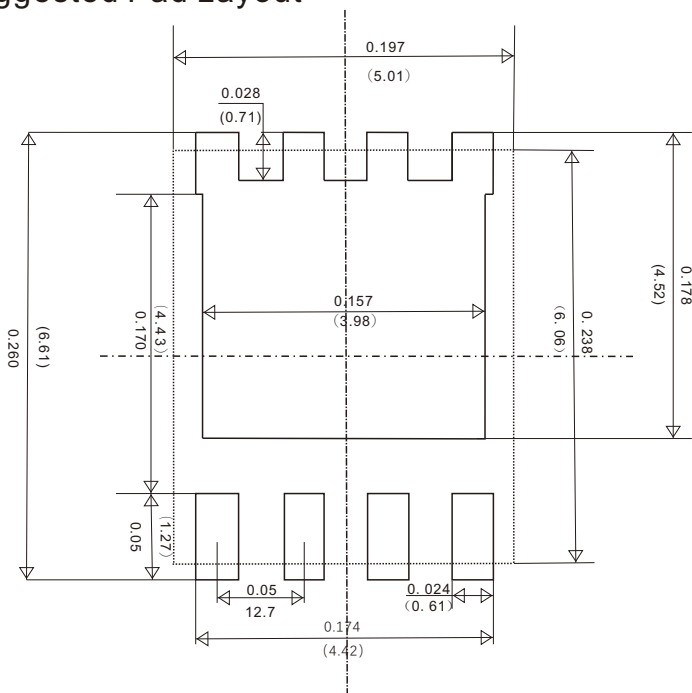


## DFN5×6 PACKAGE OUTLINE DIMENSIONS



| Symbol | Dimension In Millimeters |       |       | Dimension In Inches |       |       |
|--------|--------------------------|-------|-------|---------------------|-------|-------|
|        | Normal                   | Min   | Max   | Normal              | Min   | Max   |
| A      | --                       | 0.500 | 0.600 | --                  | 0.020 | 0.024 |
| A1     | --                       | --    | 0.005 | --                  | --    | 0.000 |
| A2     | --                       | 0.050 | 0.250 | --                  | 0.002 | 0.010 |
| D      | 5.000                    | 4.900 | 5.100 | 0.197               | 0.193 | 0.201 |
| E      | 6.000                    | 5.900 | 6.100 | 0.236               | 0.232 | 0.240 |
| D1     | 4.420                    | 4.320 | 4.520 | 0.174               | 0.170 | 0.178 |
| E1     | 4.020                    | 3.920 | 4.120 | 0.158               | 0.154 | 0.162 |
| b      | 0.410                    | 0.360 | 0.460 | 0.016               | 0.014 | 0.018 |
| L      | 0.560                    | 0.510 | 0.610 | 0.022               | 0.020 | 0.024 |
| L1     | 0.050                    | 0.010 | 0.090 | 0.002               | 0.000 | 0.004 |
| k      | 0.760 REF                |       |       | 0.030 REF           |       |       |
| e      | 1.270 BSC                |       |       | 0.050 BSC           |       |       |

## Suggested Pad Layout



## Friendship Reminder

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