

Features

- Uses PingWei advanced PerfectMOS3 technology
- Extremely low on-resistance  $R_{DS(on)}$
- Excellent  $Q_g \times R_{DS(on)}$  product(FOM)
- Qualified according to AEC-Q101 criteria

Benefits

- High robustness and reliability
- Increases maximum current capability
- Low power loss, high power density

Applications

- General automotive applications
- Motor Drivers
- DC-DC

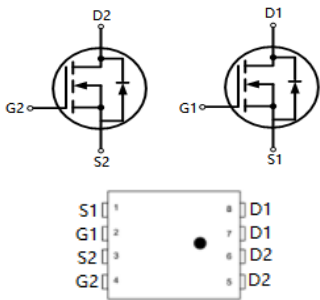
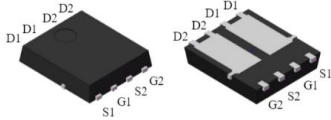


**100% DVDS Tested**  
**100% Avalanche Tested**

Product Summary

|                       |       |
|-----------------------|-------|
| $V_{DS}$              | 40V   |
| $R_{DS(on)}@10V$ typ  | 3.6mΩ |
| $I_D$ (Silicon limit) | 92A   |

DFN5x6双基岛



Package Marking and Ordering Information

| Part #        | Marking     | Package   | Packing   | Reel Size | Tape Width | Qty     |
|---------------|-------------|-----------|-----------|-----------|------------|---------|
| PWC042N04ESDQ | C042N04ESDQ | DFN5x6双基岛 | Tape&Reel | 13 inches | 12mm       | 5000pcs |

Absolute Maximum Ratings

| Parameter                                                                                                                                                                     | Symbol         | Value                | Unit       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------------|------------|
| Drain-source voltage                                                                                                                                                          | $V_{DS}$       | 40                   | V          |
| Continuous drain current<br>$T_C = 25^\circ C$ (Silicon limit)<br>$T_C = 25^\circ C$ (Package limit)<br>$T_C = 100^\circ C$ (Silicon limit)<br>$T_a = 25^\circ C$ (See RthJA) | $I_D$          | 92<br>40<br>65<br>20 | A          |
| Pulsed drain current ( $T_C = 25^\circ C$ )                                                                                                                                   | $I_{D\ pulse}$ | 160                  | A          |
| Avalanche energy, single pulse ( $L=0.1mH$ , $V_{ds}=32V$ )                                                                                                                   | $E_{AS}$       | 48                   | mJ         |
| Gate-Source voltage                                                                                                                                                           | $V_{GS}$       | $\pm 20$             | V          |
| Power dissipation<br>$T_C = 25^\circ C$<br>$T_a = 25^\circ C$ (See RthJA)                                                                                                     | $P_{tot}$      | 64<br>3.0            | W          |
| Operating junction and storage temperature                                                                                                                                    | $T_j, T_{stg}$ | -55...+175           | $^\circ C$ |
| Reflow soldering temperature (10s)                                                                                                                                            | $T_{sold}$     | 260                  | $^\circ C$ |

**Thermal Resistance**

| Parameter                              | Symbol | Value |      |      | Unit | Test Condition |
|----------------------------------------|--------|-------|------|------|------|----------------|
|                                        |        | min.  | typ. | max. |      |                |
| Thermal resistance, junction – case.   | RthJC  | -     | -    | 2.3  | °C/W | -              |
| Thermal resistance, junction – ambient | RthJA  | -     | 50   | -    | °C/W | Note 1         |

**Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)**

| Parameter | Symbol | Value |      |      | Unit | Test Condition |
|-----------|--------|-------|------|------|------|----------------|
|           |        | min.  | typ. | max. |      |                |

**Static Characteristic**

|                                  |                     |     |      |      |    |                                                          |
|----------------------------------|---------------------|-----|------|------|----|----------------------------------------------------------|
| Drain-source breakdown voltage   | BV <sub>DSS</sub>   | 40  | -    | -    | V  | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA               |
| Gate threshold voltage           | V <sub>GS(th)</sub> | 2.0 | -    | 4.0  | V  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA |
| Zero gate voltage drain current  | I <sub>DSS</sub>    | -   | 0.01 | 1    | μA | V <sub>DS</sub> =40V, V <sub>GS</sub> =0V                |
|                                  |                     | -   | -    | 100  |    | T <sub>j</sub> =25°C<br>T <sub>j</sub> =150°C            |
| Gate-source leakage current      | I <sub>GSS</sub>    | -   | ±10  | ±100 | nA | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V               |
| Drain-source on-state resistance | R <sub>DS(on)</sub> | -   | 3.6  | 4.2  | mΩ | V <sub>GS</sub> =10V, I <sub>D</sub> =20A                |
|                                  |                     | -   | 4.4  | 6.0  |    | V <sub>GS</sub> =7V, I <sub>D</sub> =20A                 |
| Transconductance                 | g <sub>fs</sub>     | -   | 23   | -    | S  | V <sub>DS</sub> =5V, I <sub>D</sub> =20A                 |

**Dynamic Characteristic**

|                              |                     |   |      |   |    |                                                                                          |
|------------------------------|---------------------|---|------|---|----|------------------------------------------------------------------------------------------|
| Input Capacitance            | C <sub>iss</sub>    | - | 1070 | - | pF | V <sub>GS</sub> =0V, V <sub>DS</sub> =20V,<br>f=1MHz                                     |
| Output Capacitance           | C <sub>oss</sub>    | - | 380  | - |    |                                                                                          |
| Reverse Transfer Capacitance | C <sub>rss</sub>    | - | 23   | - |    |                                                                                          |
| Gate Total Charge            | Q <sub>G</sub>      | - | 18   | - | nC | V <sub>DS</sub> =20V, I <sub>D</sub> =30A<br>, V <sub>GS</sub> =10V                      |
| Gate-Source charge           | Q <sub>gs</sub>     | - | 8    | - |    |                                                                                          |
| Gate-Drain charge            | Q <sub>gd</sub>     | - | 3    | - |    |                                                                                          |
| Turn-on delay time           | t <sub>d(on)</sub>  | - | 9    | - | ns | V <sub>GS</sub> =10V, V <sub>DD</sub> =20V,<br>R <sub>G</sub> =10Ω, R <sub>L</sub> =1.6Ω |
| Rise time                    | t <sub>r</sub>      | - | 23   | - |    |                                                                                          |
| Turn-off delay time          | t <sub>d(off)</sub> | - | 19   | - |    |                                                                                          |
| Fall time                    | t <sub>f</sub>      | - | 9    | - |    |                                                                                          |
| Gate resistance              | R <sub>G</sub>      | - | 2.2  | - | Ω  | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V,<br>f=1MHz                                      |

**Body Diode Characteristic**

| Parameter                             | Symbol      | Value |      |      | Unit | Test Condition                            |
|---------------------------------------|-------------|-------|------|------|------|-------------------------------------------|
|                                       |             | min.  | typ. | max. |      |                                           |
| Body Diode Forward Voltage            | $V_{SD}$    | -     | -    | 1.2  | V    | $V_{GS}=0V, I_{SD}=20A$                   |
| Body Diode Continuous Forward Current | $I_S$       | -     | -    | 40   | A    | TC = 25°C                                 |
| Body Diode Pulsed Current             | $I_S$ pulse | -     | -    | 160  | A    | TC = 25°C                                 |
| Body Diode Reverse Recovery Time      | $t_{rr}$    | -     | 14   | -    | ns   | $V_D=20V, I_F=20A,$<br>$dI/dt=150A/\mu s$ |
| Body Diode Reverse Recovery Charge    | $Q_{rr}$    | -     | 5.3  | -    | nC   |                                           |

Note1 : 20mm x 20mm x 1.6mm,1oz single Copper FR-4.

## Typical Performance Characteristics

Fig 1: Output Characteristics

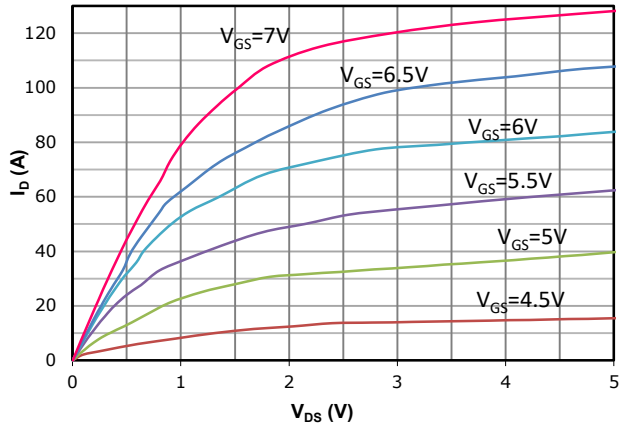


Fig 2: Transfer Characteristics

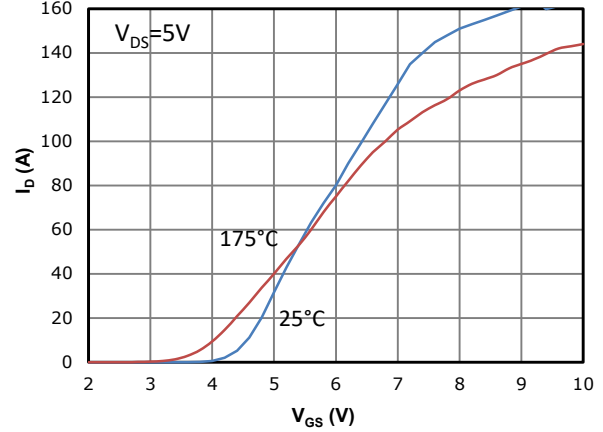


Fig 3: Rds(on) vs Drain Current and Gate Voltage

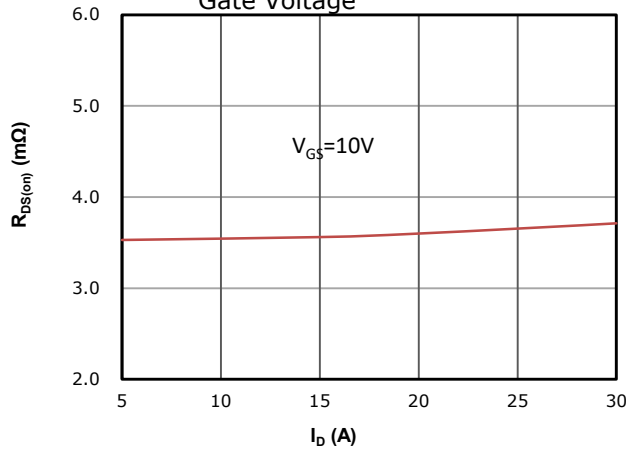


Fig 4: Rds(on) vs Gate Voltage

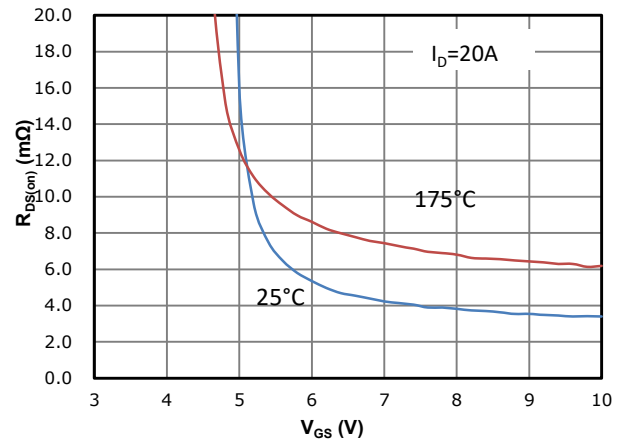


Fig 5: Rds(on) vs. Temperature

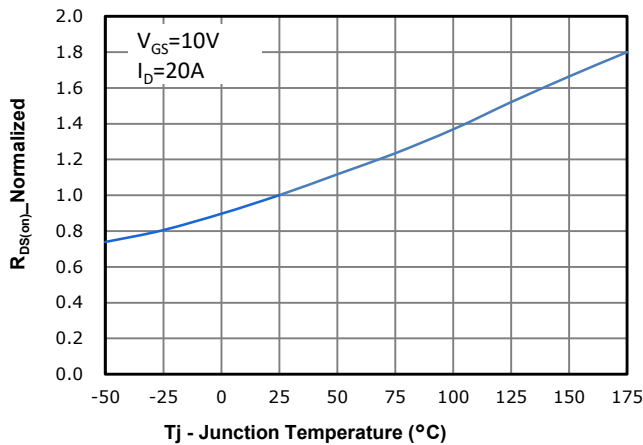


Fig 6: Vgs(th) vs. Temperature

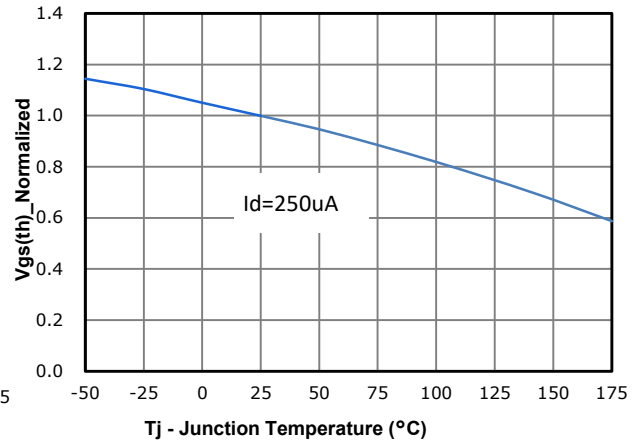


Fig 7: BVdss vs. Temperature

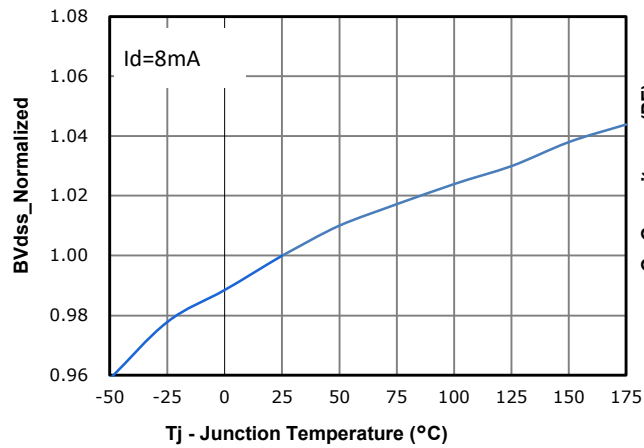


Fig 8: Capacitance Characteristics

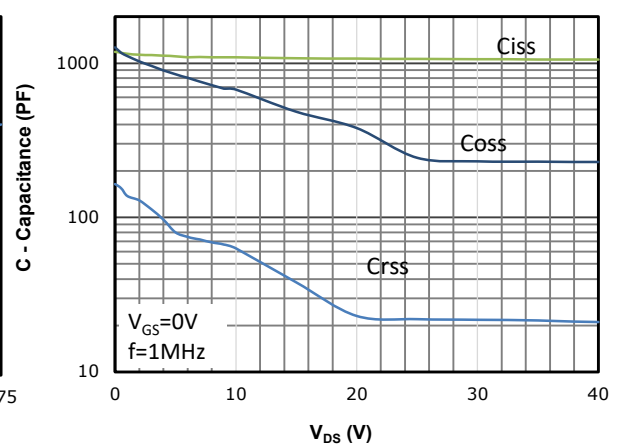


Fig 9: Gate Charge Characteristics

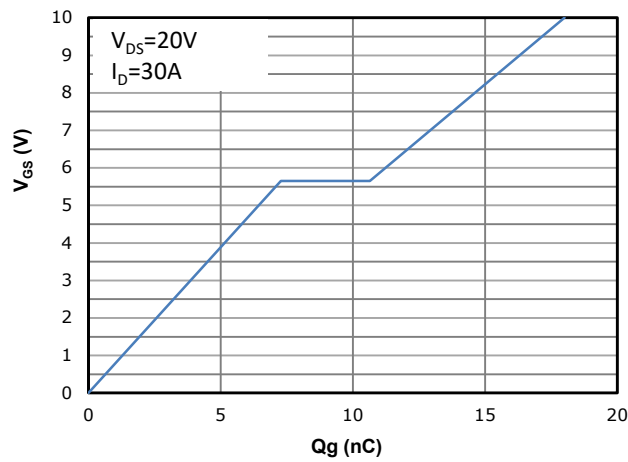


Fig 10: Body-diode Forward Characteristics

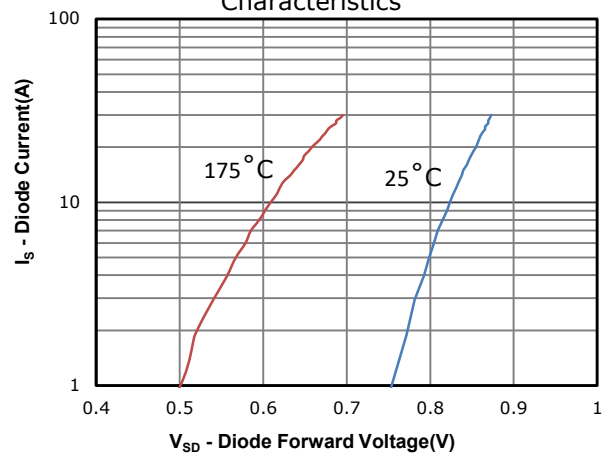


Fig 11: Power Dissipation

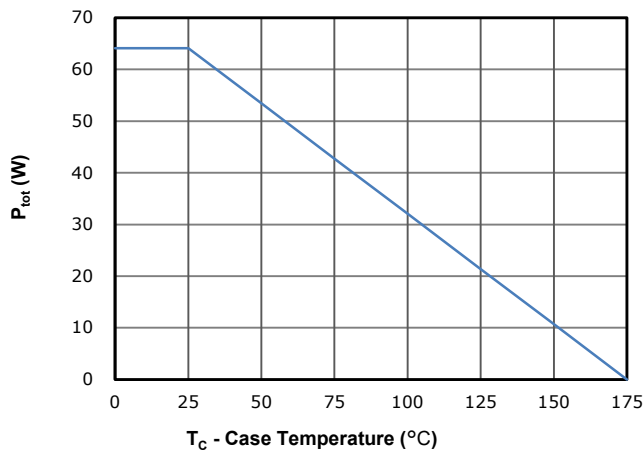


Fig 12: Drain Current Derating

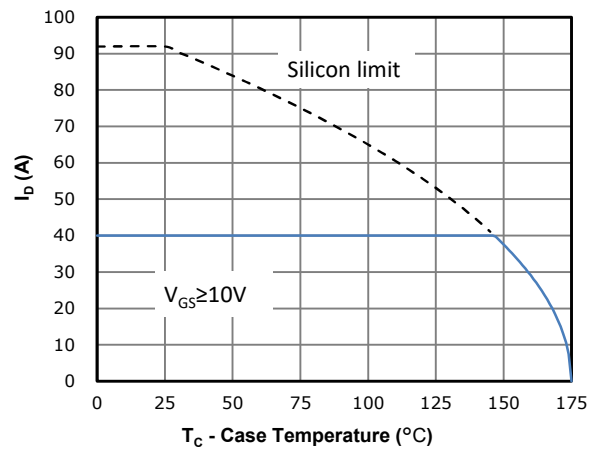


Fig 13: Safe Operating Area

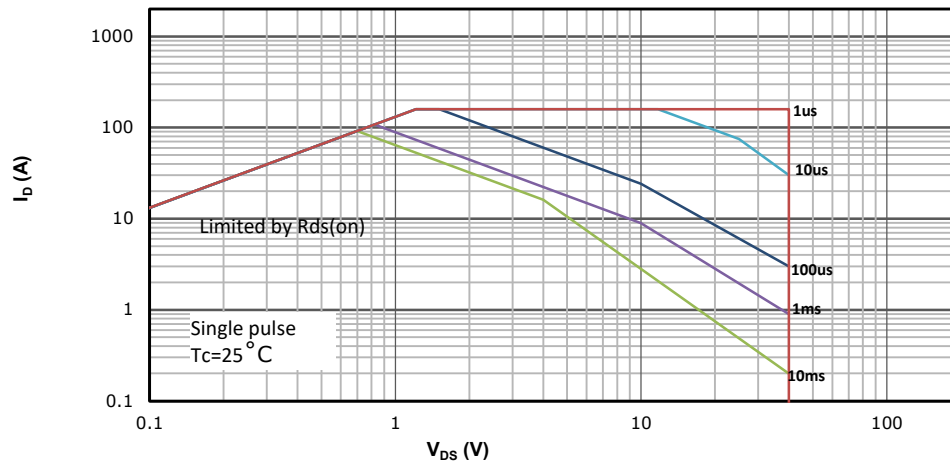
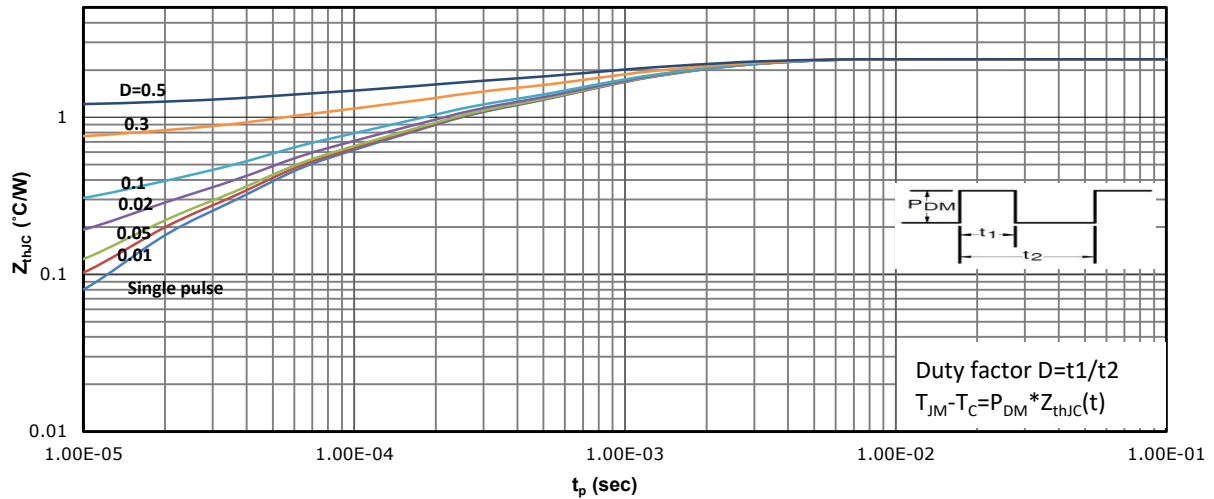
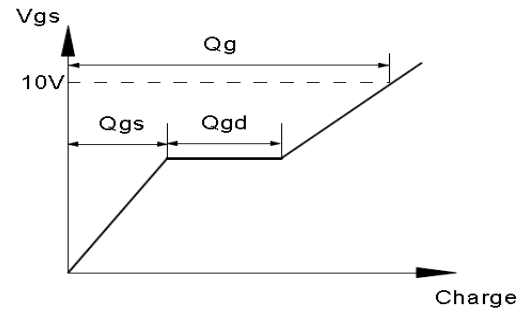
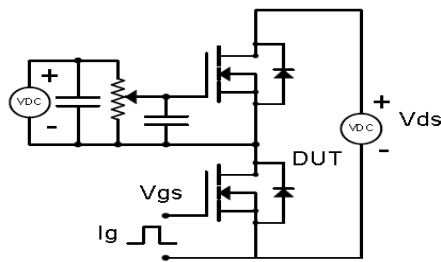


Fig 14: Max. Transient Thermal Impedance

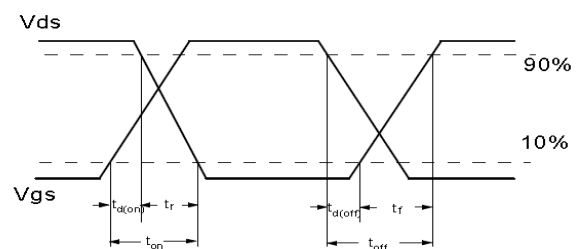
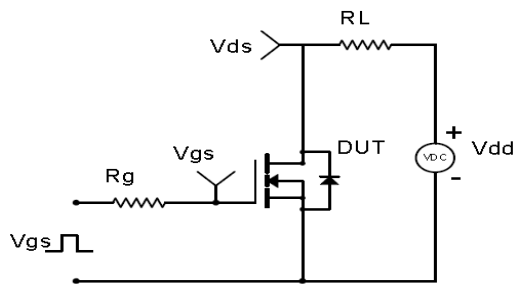


## Test Circuit & Waveform

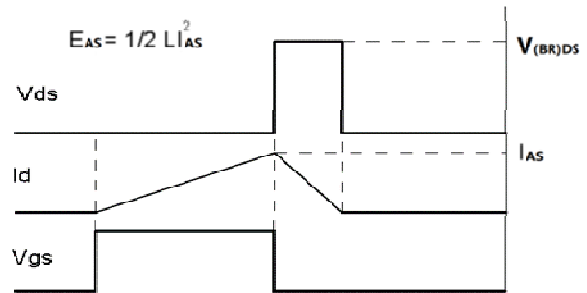
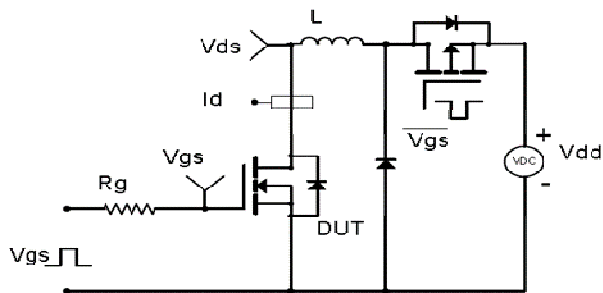
Gate Charge Test Circuit & Waveform



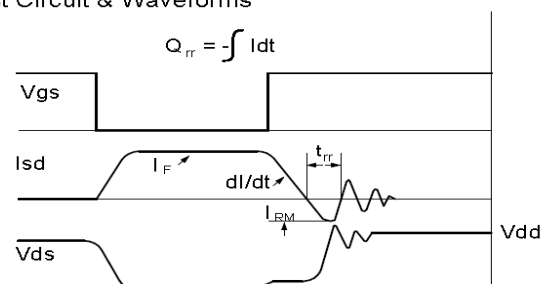
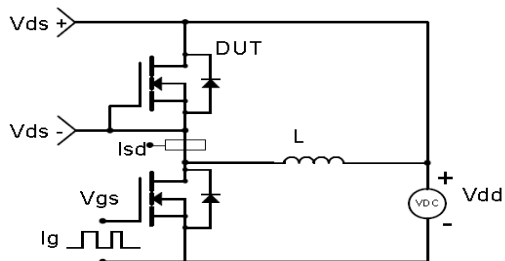
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

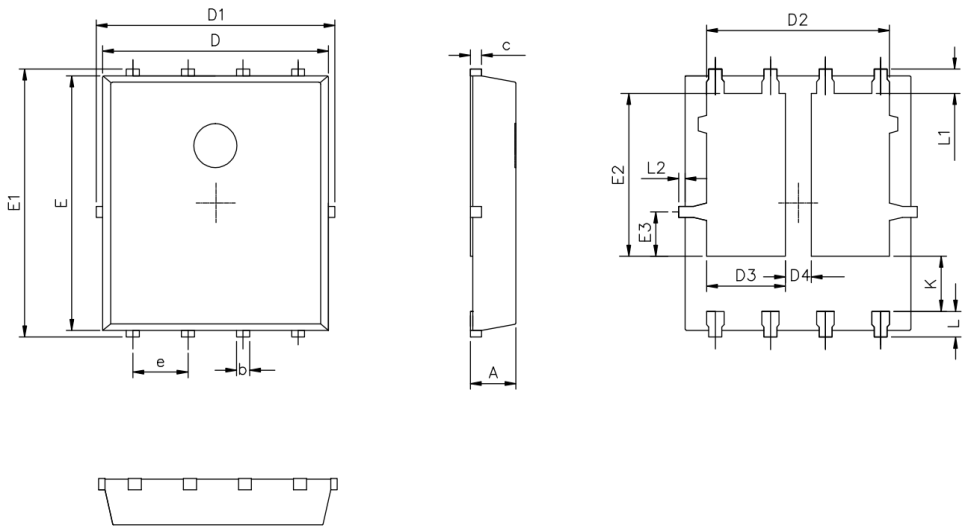


Diode Recovery Test Circuit & Waveforms





Package Outline: DFN5×6 Double Base Island Package Outline



| SYMBOL | MILLIMETERS |      | INCHES |       |
|--------|-------------|------|--------|-------|
|        | MIN         | MAX  | MIN    | MAX   |
| A      | 0.90        | 1.10 | 0.035  | 0.043 |
| b      | 0.25        | 0.50 | 0.010  | 0.020 |
| c      | 0.10        | 0.30 | 0.004  | 0.012 |
| D      | 4.80        | 5.30 | 0.189  | 0.209 |
| D1     | 4.90        | 5.50 | 0.193  | 0.217 |
| D2     | 3.92        | 4.20 | 0.154  | 0.165 |
| D3     | 1.61        | 1.81 | 0.063  | 0.071 |
| D4     | 0.50        | 0.70 | 0.020  | 0.028 |
| E      | 5.65        | 5.85 | 0.222  | 0.230 |
| E1     | 5.90        | 6.20 | 0.232  | 0.244 |
| E2     | 3.33        | 3.78 | 0.131  | 0.149 |
| E3     | 0.80        | 1.00 | 0.031  | 0.039 |
| e      | 1.27        |      | 0.050  |       |
| L      | 0.40        | 0.70 | 0.016  | 0.028 |
| L1     | 0.65        |      | 0.026  |       |
| L2     | 0.00        | 0.15 | 0.000  | 0.006 |
| K      | 1.00        | 1.50 | 0.039  | 0.059 |

**Revision History**

| Revision | Date      | Major changes                                                                                                                        |
|----------|-----------|--------------------------------------------------------------------------------------------------------------------------------------|
| 1.0      | 2025/4/20 | Release of Normal Version.                                                                                                           |
| 1.1      | 2025/9/17 | Update R <sub>don</sub> (10V ) typ from 3.9 to 3.6, max value from 4.6 to 4.2;<br>Update R <sub>don</sub> (7V ) typ from 4.8 to 4.4; |

**Disclaimer**

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The product is not intended for use in applications that require extraordinary levels of quality and reliability, such as aviation/aerospace and life-support devices or systems.

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