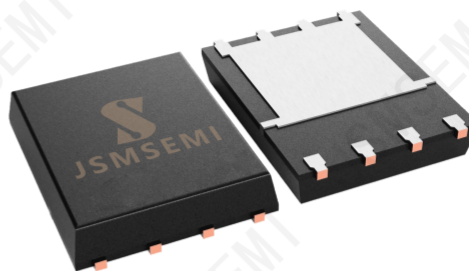


## Product Summary

- $V_{DS}$  60V
- $I_D$  265A
- $R_{DS(ON)}$  (at  $V_{GS}=10V$ )  $<1.4m\Omega$
- 100% EAS Tested
- 100%  $\nabla V_{DS}$  Tested



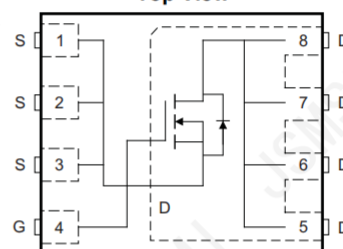
## General Description

- Split gate trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low  $R_{DS(ON)}$
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

## Applications

- Power switching application
- Uninterruptible power supply
- DC-DC convertor
- Motor drivers

Top View



### ■ Absolute Maximum Ratings ( $T_A=25^\circ\text{C}$ unless otherwise noted)

| Parameter                              |                         | Symbol         | Limit           | Unit             |
|----------------------------------------|-------------------------|----------------|-----------------|------------------|
| Drain-source Voltage                   |                         | $V_{DS}$       | 60              | V                |
| Gate-source Voltage                    |                         | $V_{GS}$       | $\pm 20$        | V                |
| Drain Current                          | $T_C=25^\circ\text{C}$  | $I_D$          | 265             | A                |
|                                        | $T_C=100^\circ\text{C}$ |                | 185             |                  |
| Pulsed Drain Current <sup>A</sup>      |                         | $I_{DM}$       | 1060            | A                |
| Avalanche energy <sup>B</sup>          |                         | EAS            | 625             | mJ               |
| Total Power Dissipation <sup>C</sup>   | $T_C=25^\circ\text{C}$  | $P_D$          | 198             | W                |
|                                        | $T_C=100^\circ\text{C}$ |                | 120             |                  |
| Junction and Storage Temperature Range |                         | $T_J, T_{STG}$ | $-55 \sim +150$ | $^\circ\text{C}$ |

### ■ Thermal resistance

| Parameter                                           |              | Symbol          | Typ | Max | Units              |
|-----------------------------------------------------|--------------|-----------------|-----|-----|--------------------|
| Thermal Resistance Junction-to-Ambient <sup>D</sup> | Steady-State | $R_{\theta JA}$ |     | 50  | $^\circ\text{C/W}$ |
| Thermal Resistance Junction-to-Case                 | Steady-State | $R_{\theta JC}$ |     | 0.8 |                    |

## Ordering Information

| Order number          | Package    | Marking   | Operation Temperature Range  | MSL Grade | Ship, Quantity | Green |
|-----------------------|------------|-----------|------------------------------|-----------|----------------|-------|
| BSC014N06NSTATMA1-JSM | DFN5060-8L | 014N06QGH | $-55$ to $150^\circ\text{C}$ | 1         | T&R, 5000      | RoHS  |

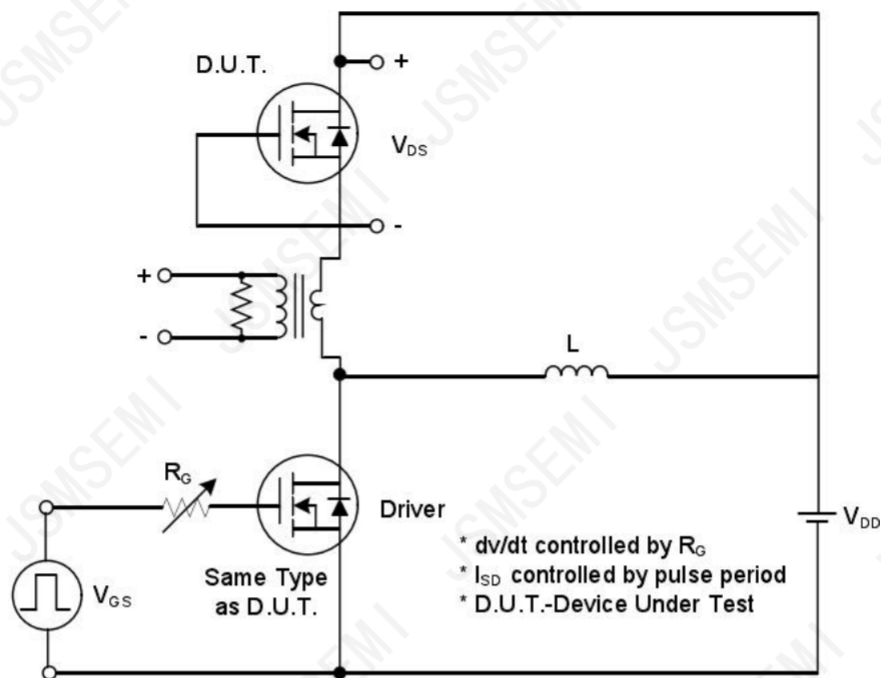
**■ Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$  unless otherwise noted)

| Parameter                                         | Symbol               | Test Condition                                                                                | Min. | Typ. | Max. | Unit |
|---------------------------------------------------|----------------------|-----------------------------------------------------------------------------------------------|------|------|------|------|
| Off Characteristics <sup>(6)</sup>                |                      |                                                                                               |      |      |      |      |
| Drain-Source Breakdown Voltage                    | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                                                  | 60   | -    | -    | V    |
| Zero Gate Voltage Drain Current                   | I <sub>DSS</sub>     | V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V                                                   | -    | -    | 1.0  | μA   |
|                                                   |                      | T <sub>J</sub> = 125°C                                                                        | -    | -    | 100  | μA   |
| Gate-Source Leakage Current                       | I <sub>GSS</sub>     | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V                                                  | -    | -    | ±100 | nA   |
| On Characteristics <sup>(6)</sup>                 |                      |                                                                                               |      |      |      |      |
| Gate Threshold Voltage                            | V <sub>GS(th)</sub>  | V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250μA                                    | 2.0  | 3.0  | 4.0  | V    |
| Static Drain-Source On-Resistance                 | R <sub>DS(ON)</sub>  | V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A                                                   | -    | 1.1  | 1.4  | mΩ   |
| Forward Transconductance                          | g <sub>fs</sub>      | V <sub>DS</sub> = 5.0V, I <sub>D</sub> = 20A                                                  | -    | 120  | -    | S    |
| Diodes Forward Voltage                            | V <sub>SD</sub>      | I <sub>S</sub> = 2.0A, V <sub>GS</sub> = 0V                                                   | -    | 0.7  | 1.2  | V    |
| Dynamic Characteristics <sup>(7)</sup>            |                      |                                                                                               |      |      |      |      |
| Input Capacitance                                 | C <sub>iss</sub>     | V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 300KHz                                       | -    | 6990 | -    | pF   |
| Output Capacitance                                | C <sub>oss</sub>     |                                                                                               | -    | 2750 | -    | pF   |
| Reverse Transfer Capacitance                      | C <sub>rss</sub>     |                                                                                               | -    | 60   | -    | pF   |
| Gate Resistance                                   | R <sub>g</sub>       | V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V, f = 1MHz                                          | -    | 1.5  | -    | Ω    |
| Switching Characteristics <sup>(7)</sup>          |                      |                                                                                               |      |      |      |      |
| Turn-On DelayTime                                 | t <sub>d(on)</sub>   | V <sub>GS</sub> = 10V, V <sub>DS</sub> = 30V<br>I <sub>D</sub> = 20A, R <sub>GEN</sub> = 5.0Ω | -    | 24   | -    | ns   |
| Rise Time                                         | t <sub>r</sub>       |                                                                                               | -    | 15   | -    | ns   |
| Turn-Off DelayTime                                | t <sub>d(off)</sub>  |                                                                                               | -    | 45   | -    | ns   |
| Fall Time                                         | t <sub>f</sub>       |                                                                                               | -    | 13   | -    | ns   |
| Gate Charge Characteristics <sup>(7)</sup>        |                      |                                                                                               |      |      |      |      |
| Total Gate Charge (V <sub>GS</sub> = 10V)         | Q <sub>g</sub>       | V <sub>DS</sub> = 30V, I <sub>D</sub> = 20A<br>V <sub>GS</sub> = 10V                          | -    | 85   | -    | nC   |
| Total Gate Charge (V <sub>GS</sub> = 6.0V)        | Q <sub>g</sub>       |                                                                                               | -    | 97   | -    | nC   |
| Gate-Source Charge                                | Q <sub>gs</sub>      |                                                                                               | -    | 25   | -    | nC   |
| Gate-Drain Charge                                 | Q <sub>gd</sub>      |                                                                                               | -    | 15   | -    | nC   |
| Gate Plateau Voltage                              | V <sub>plateau</sub> |                                                                                               | -    | 3.0  | -    | V    |
| Drain-Source Diode Characteristics <sup>(7)</sup> |                      |                                                                                               |      |      |      |      |
| Body Diode Reverse Recovery Time                  | t <sub>rr</sub>      | I <sub>F</sub> = 1A, dI/dt = 100A/μs,                                                         | -    | 56   | -    | ns   |
| Body Diode Reverse Recovery Charge                | Q <sub>rr</sub>      | T <sub>J</sub> = 25°C                                                                         | -    | 55   | -    | nC   |
| Diode Forward Current                             | I <sub>S</sub>       | T <sub>C</sub> = 25°C                                                                         | -    | -    | 265  | A    |

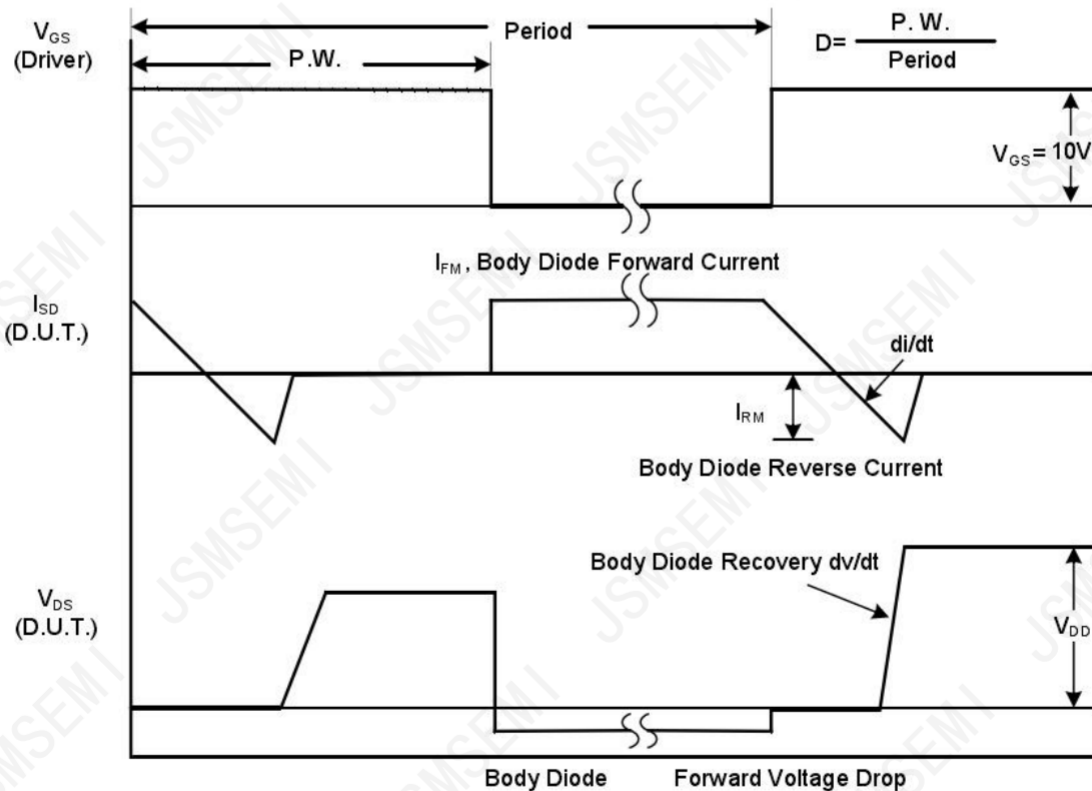
**Notes:**

1. This current is chip limited, which is calculated based on  $R_{thjc}$ .
2. This current is calculated on single pulse with  $10\mu s$  Single Pulse.
3. Defined by design, not subject to production test,  $E_{AS}$  condition:  $T_J=25^{\circ}\text{C}, V_{DD}=30V, V_{GS}=10V, L=1.0mH$ .
4. Device mounted on FR-4 substrate PC board with 2oz copper in 1inch square cooling area.
5. Thermal resistance from junction to the exposed drain pad.
6. Short duration pulse test used to minimize self-heating effect.
7. Defined by design, not subject to production.

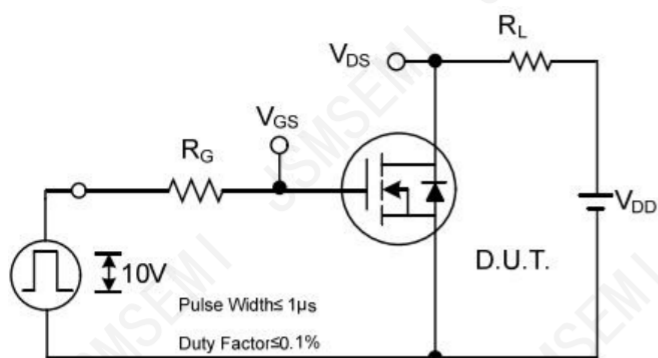
■ RATING AND CHARACTERISTIC CURVES



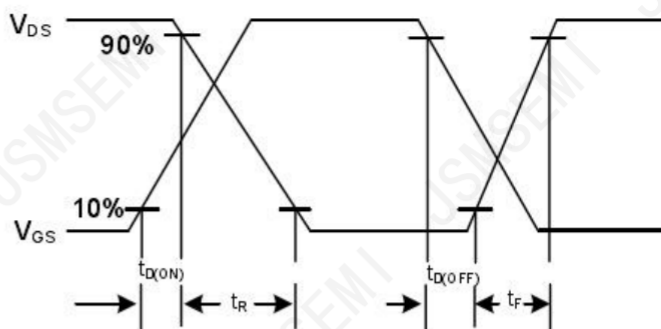
Peak Diode Recovery  $dv/dt$  Test Circuit



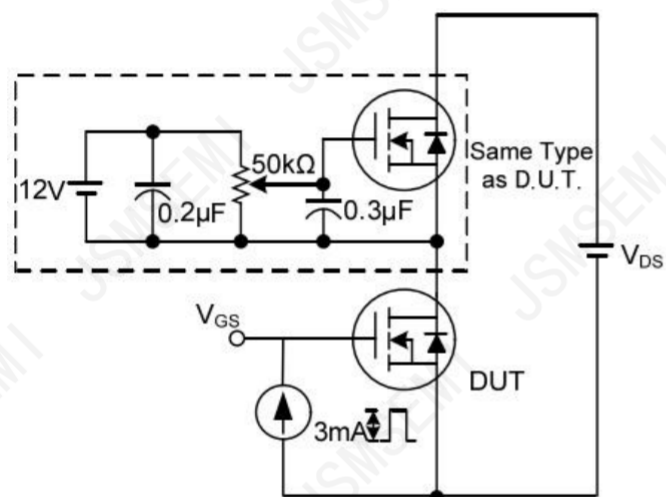
Peak Diode Recovery  $dv/dt$  Waveforms



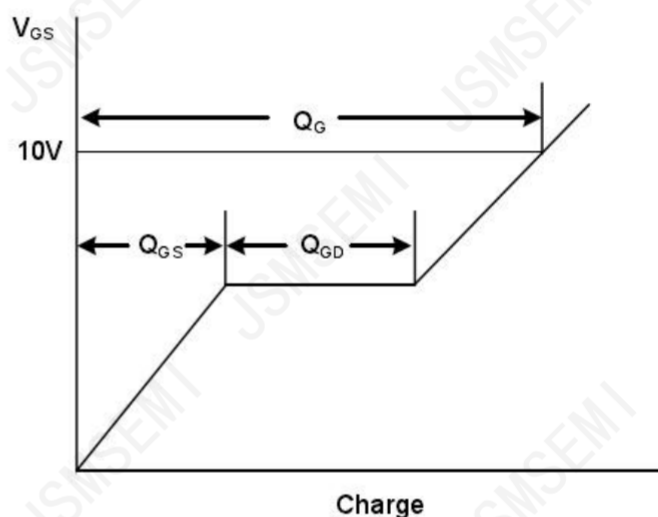
Switching Test Circuit



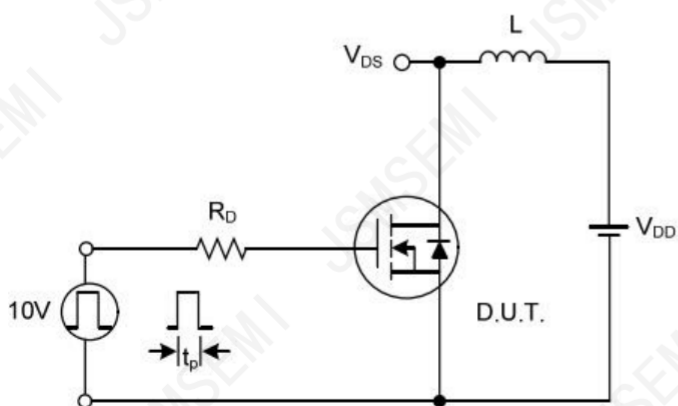
Switching Waveforms



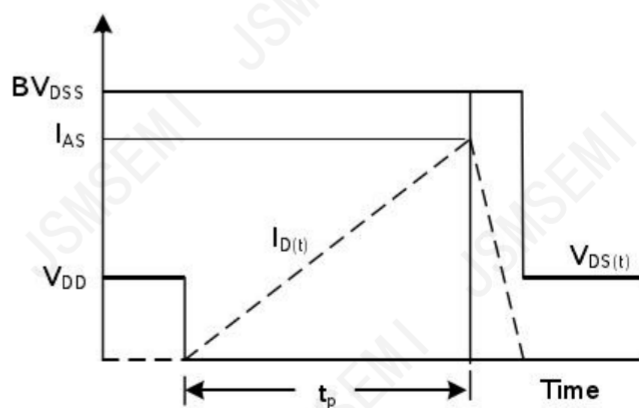
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

■ Typical Electrical and Thermal Characteristics Diagrams

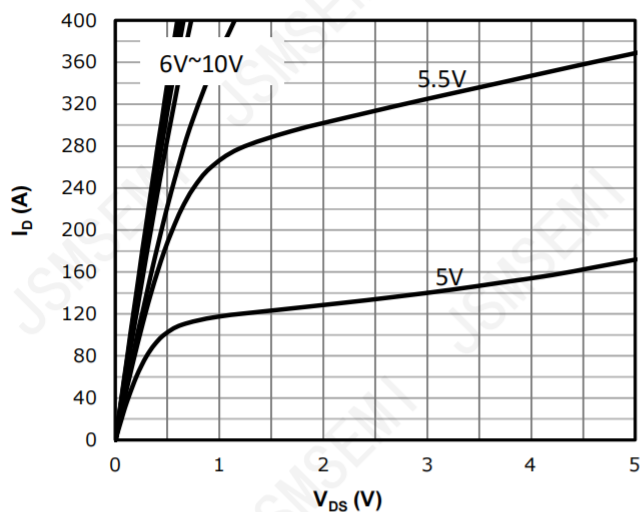


Fig 1: Output Characteristics

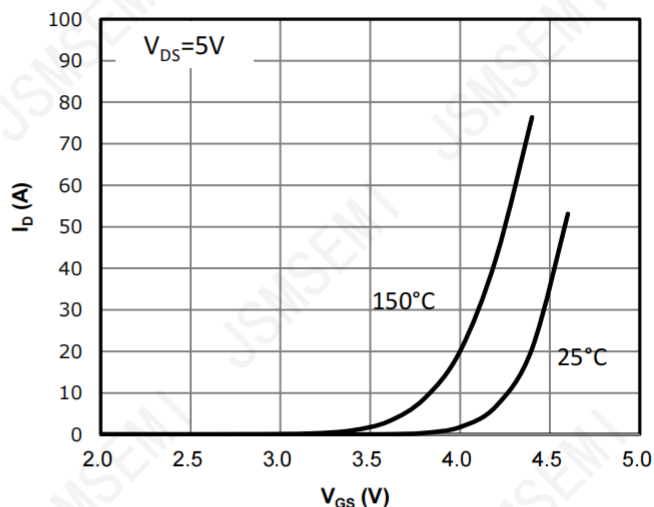


Fig 2: Transfer Characteristics

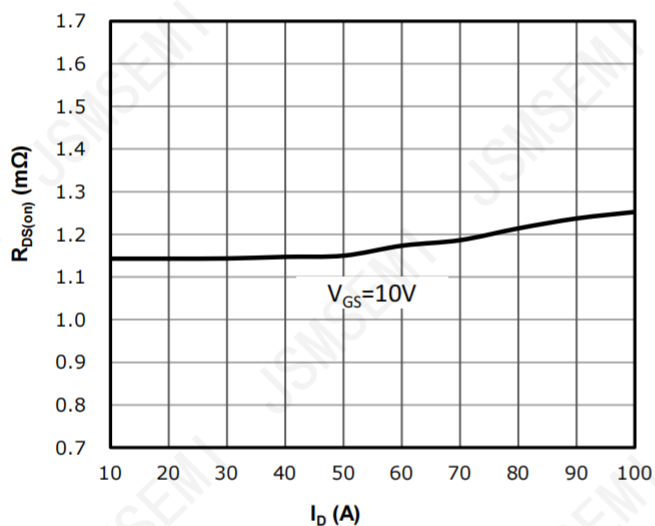


Fig 3:  $R_{DS(on)}$  vs Drain Current and Gate Voltage

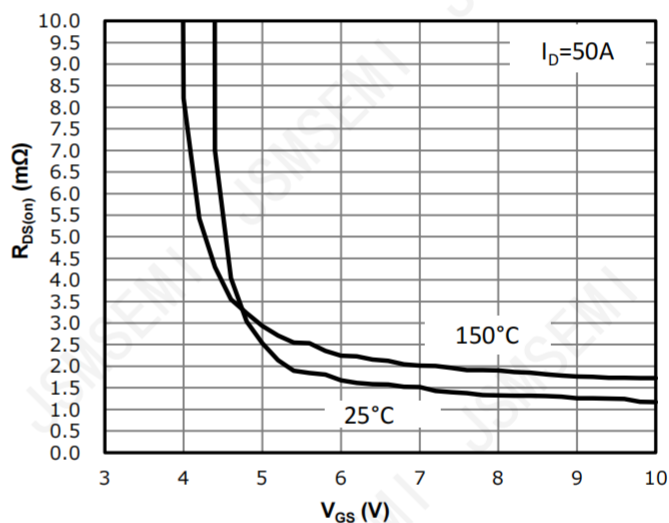


Fig 4:  $R_{DS(on)}$  vs Gate Voltage

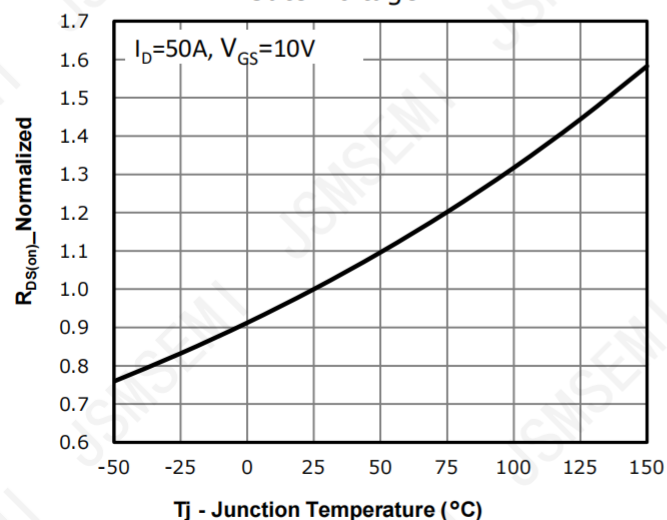


Fig 5:  $R_{DS(on)}$  vs. Temperature

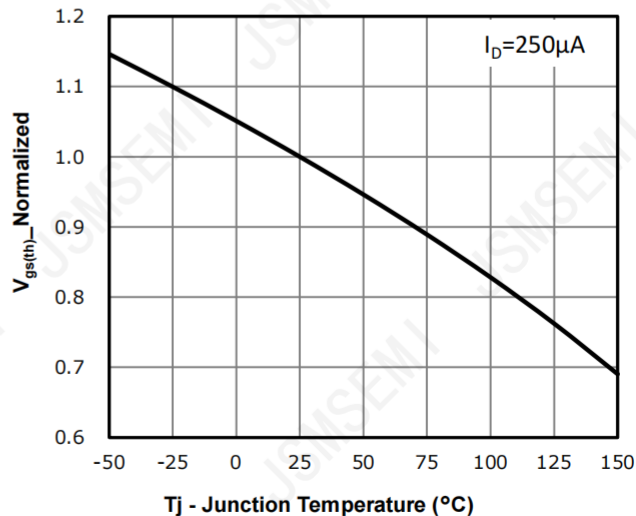


Fig 6:  $V_{GS(th)}$  vs. Temperature

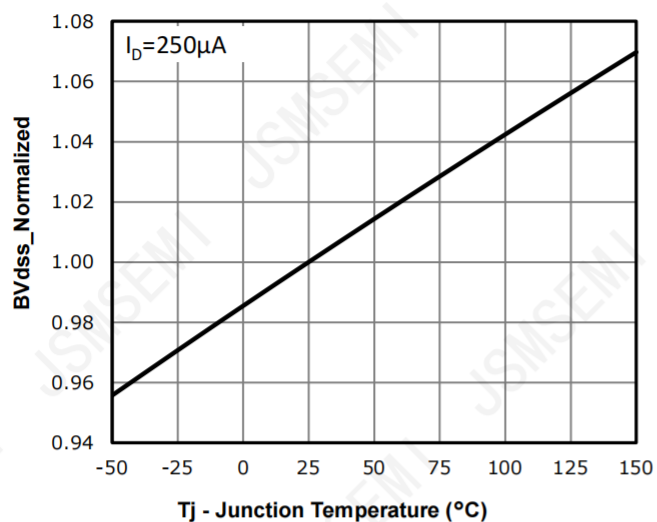


Fig 7: BVdss vs. Temperature

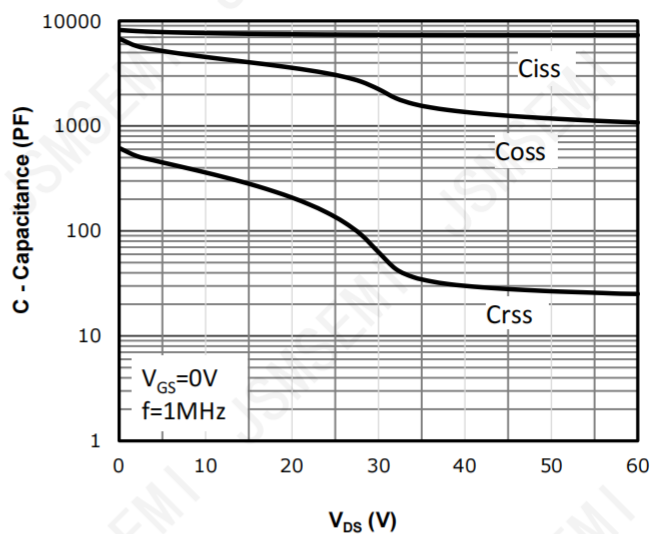


Fig 8: Capacitance Characteristics

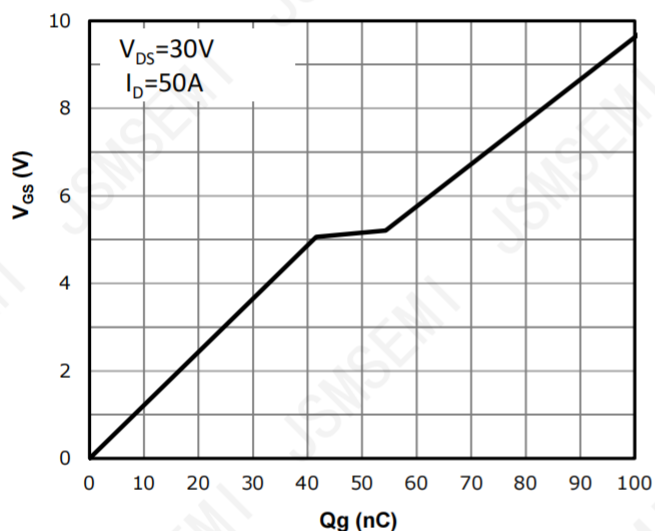


Fig 9: Gate Charge Characteristics

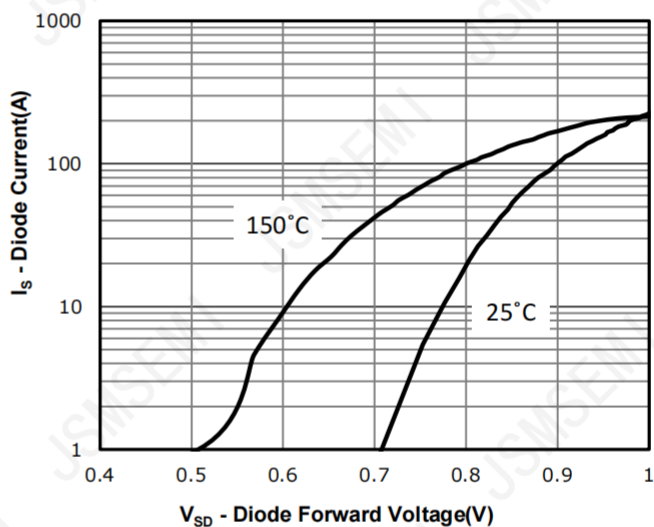


Fig 10: Body-diode Forward Characteristics

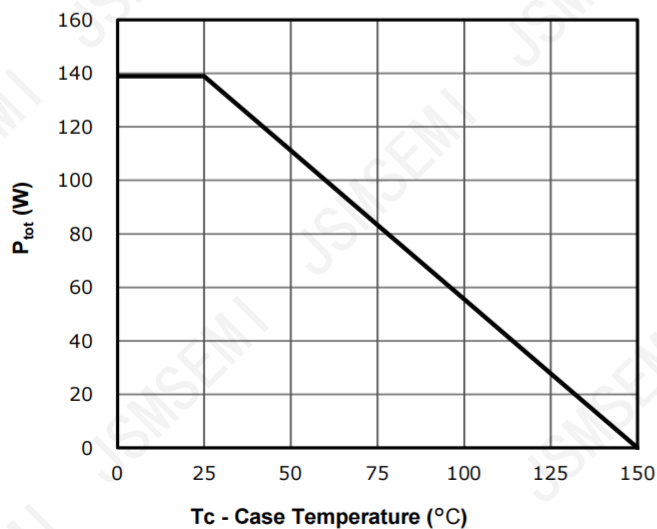


Fig 11: Power Dissipation

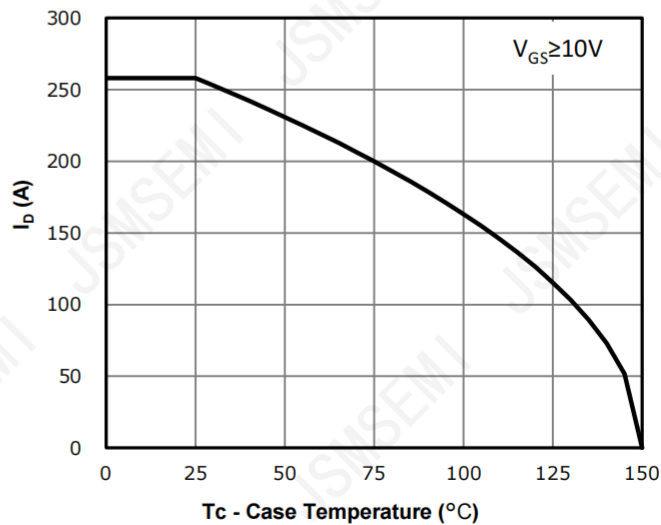


Fig 12: Drain Current Derating

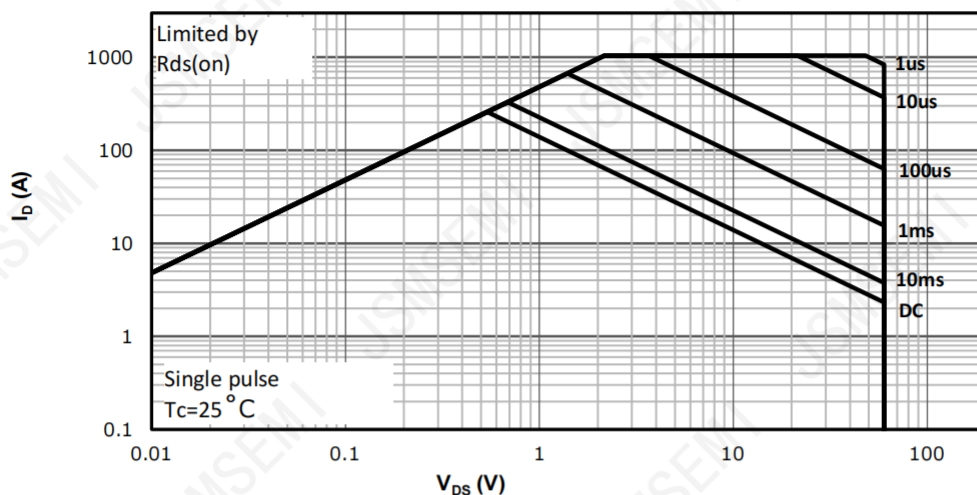


Fig 13: Safe Operating Area

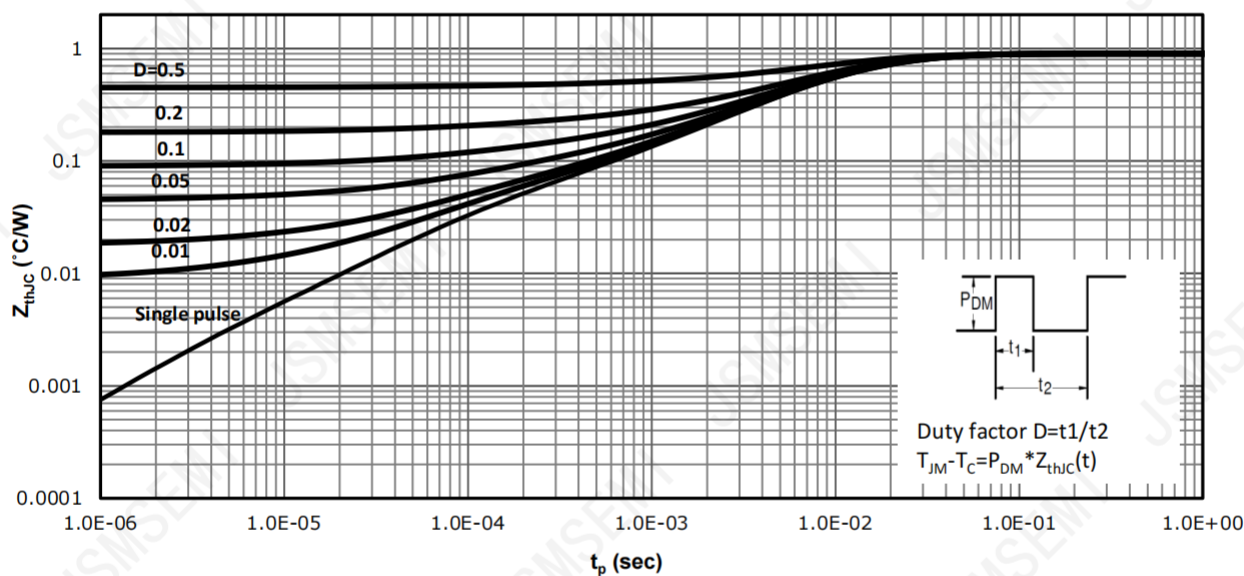
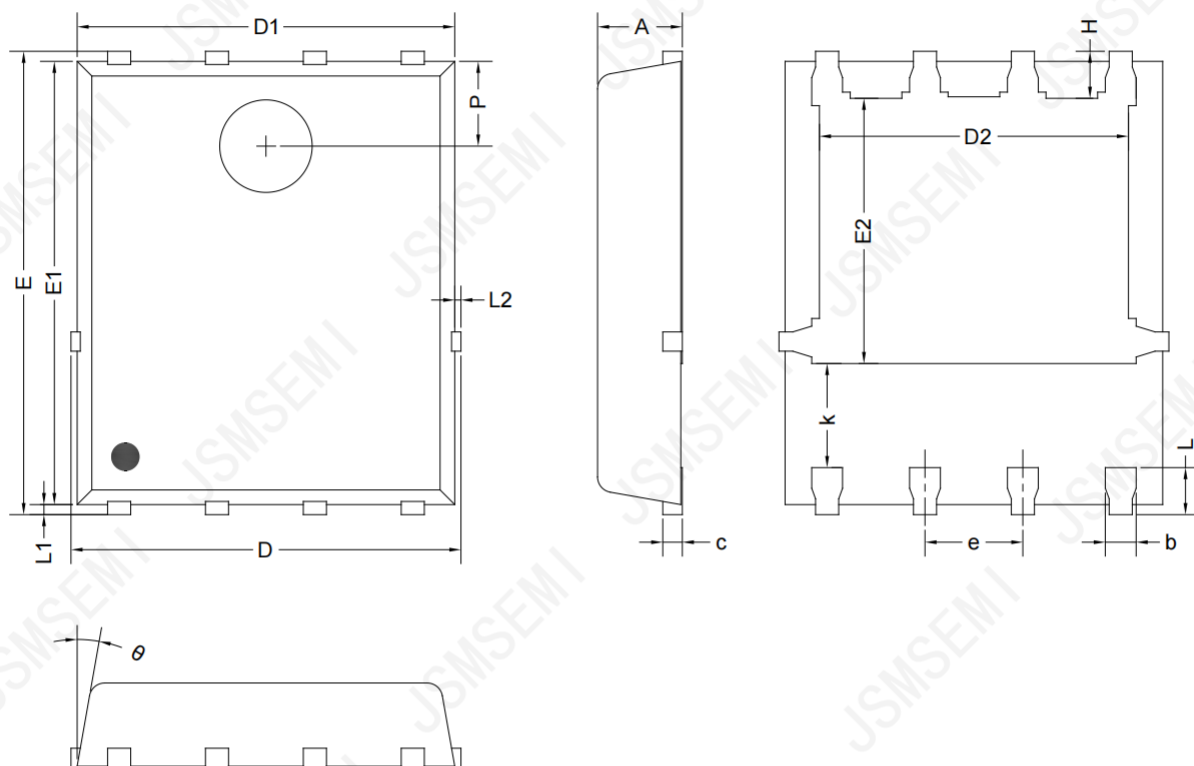


Fig 14: Max. Transient Thermal Impedance

## Package Information

### PDFN5060-8L



| Symbol | Dimensions In Millimeters |       |       |
|--------|---------------------------|-------|-------|
|        | MIN                       | NOM   | MAX   |
| A      | 1.000                     | 1.100 | 1.200 |
| b      | 0.350                     | 0.400 | 0.450 |
| c      | 0.210                     | 0.250 | 0.340 |
| D      | 4.800                     | -     | 5.100 |
| D1     | 4.800                     | 4.900 | 5.000 |
| D2     | 3.910                     | 4.010 | 4.110 |
| E      | 5.900                     | 6.000 | 6.100 |
| E1     | 5.700                     | 5.750 | 5.800 |
| E2     | 3.340                     | 3.440 | 3.540 |
| e      | 1.270 BSC                 |       |       |
| H      | 0.510                     | 0.610 | 0.710 |
| k      | 1.100                     | -     | -     |
| L      | 0.510                     | 0.610 | 0.710 |
| L1     | 0.060                     | 0.130 | 0.200 |
| L2     | -                         | -     | 0.100 |
| P      | 1.000                     | 1.100 | 1.200 |
| θ      | 8°                        | 10°   | 12°   |

NOTE: This drawing is subject to change without notice.

## Revision History

| Rev. | Change          | Date      |
|------|-----------------|-----------|
| V1.0 | Initial version | 6/27/2021 |
|      |                 |           |

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