

**Features**

- ◆ Extremely low on-resistance  $R_{DS(on)}$
- ◆ Excellent  $Q_g \times R_{DS(on)}$  product(FOM)
- ◆ Excellent Low Ciss
- ◆ High robustness and reliability
- ◆ Increases maximum current capability
- ◆ Low power loss, high power density
- ◆ Easy paralleling

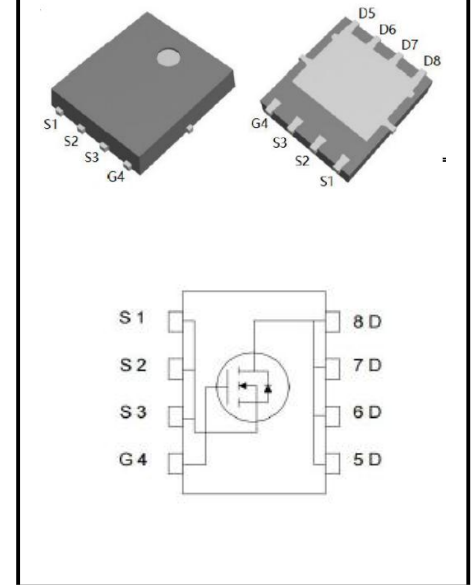
**Applications**

- ◆ Synchronous Rectification for AC/DC Quick Charger
- ◆ Battery management
- ◆ UPS(Uninterruptible Power Supplies)

**MOSFET**

140A,100V,3.8mΩ N-CHANNEL MOSFET

**View and Internal  
Schematic Diagram  
PDFN5\*6-8L**



| Parameter          | Values | Unit |
|--------------------|--------|------|
| $BV_{DSS}$         | 100    | V    |
| $I_D$              | 140    | A    |
| $R_{DS(on)}$ (max) | 3.8    | mΩ   |
| $V_{GS(th)}$ (Typ) | 3.0    | V    |

| Ordering Code | Marking      | Package    | Packaging   |
|---------------|--------------|------------|-------------|
| XC3P8N10GHV8  | XC3P8N10GHV8 | PDFN5*6-8L | Tape & Reel |

**Absolute Maximum Ratings( $T_C=25^{\circ}\text{C}$ , unless otherwise noted)**

| Parameter                                        | Symbol           | Values |     |     | Unit               | Note/Test Conditions                                     |
|--------------------------------------------------|------------------|--------|-----|-----|--------------------|----------------------------------------------------------|
|                                                  |                  | Min    | Typ | Max |                    |                                                          |
| Drain-Source Voltage                             | $V_{DSS}$        | -      | -   | 100 | V                  | -                                                        |
| Gate-Source Voltage                              | $V_{GS}$         | -20    | -   | 20  | V                  | -                                                        |
| Continuous Drain Current(Note 1)                 | $I_D$            | -      | -   | 140 | A                  | $T_C=25^{\circ}\text{C}$                                 |
|                                                  |                  | -      | -   | 89  |                    | $T_C=100^{\circ}\text{C}$                                |
| Pulsed Drain Current(Note 2)                     | $I_{DM}$         | -      | -   | 560 | A                  | -                                                        |
| Single Pulse Avalanche Energy                    | $E_{AS}$         | -      | -   | 300 | mJ                 | $L=0.5\text{mH}, V_D=48\text{V}, T_C=25^{\circ}\text{C}$ |
| Power Dissipation                                | $P_D$            | -      | -   | 139 | W                  | $T_C=25^{\circ}\text{C}$                                 |
|                                                  |                  | -      | -   | 2.5 |                    | $T_a=25^{\circ}\text{C}$                                 |
| Operating Junction and Storage Temperature Range | $T_{j}, T_{STG}$ | -55    | -   | 150 | $^{\circ}\text{C}$ | -                                                        |

**Thermal Characteristics**

| Parameter                                | Symbol        | Values |     |     | Unit                        | Note/Test Conditions |
|------------------------------------------|---------------|--------|-----|-----|-----------------------------|----------------------|
|                                          |               | Min    | Typ | Max |                             |                      |
| Thermal resistance , Junction to Case    | $R_{th(j-c)}$ | -      | 0.5 | 0.9 | $^{\circ}\text{C}/\text{W}$ | -                    |
| Thermal resistance , Junction to Ambient | $R_{th(j-a)}$ | -      | -   | 50  |                             | -                    |

## Electrical Characteristics ( $T_j=25^{\circ}\text{C}$ , unless otherwise noted)

### Static characteristics

| Parameter                        | Symbol       | Values |          |           | Unit       | Note/Test Conditions                             |
|----------------------------------|--------------|--------|----------|-----------|------------|--------------------------------------------------|
|                                  |              | Min    | Typ      | Max       |            |                                                  |
| Drain-Source Breakdown Voltage   | $BV_{DSS}$   | 100    | -        | -         | V          | $V_{GS}=0V, I_D=250\mu A$                        |
| Zero Gate Voltage Drain Current  | $I_{DSS}$    | -      | 0.02     | 1         | $\mu A$    | $V_{DS}=60V, V_{GS}=0V, T_j=25^{\circ}\text{C}$  |
|                                  |              | -      | -        | 100       |            | $V_{DS}=60V, V_{GS}=0V, T_j=150^{\circ}\text{C}$ |
| Gate-Body Leakage Current        | $I_{GSS}$    | -      | $\pm 10$ | $\pm 100$ | nA         | $V_{GS}=20V, V_{DS}=0V$                          |
| Gate-Source Threshold Voltage    | $V_{GS(th)}$ | 2.5    | -        | 3.5       | V          | $V_{DS}=V_{GS}, I_D=250\mu A$                    |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | -      | 3.0      | 3.8       | m $\Omega$ | $V_{GS}=10V, I_D=50A$                            |
| Gate Resistance                  | $R_g$        | -      | 1.6      | -         | $\Omega$   | $V_{GS}=0V, V_{DS}=0V, f=1\text{MHz}$            |
| Forward Transconductance         | $g_{fs}$     | -      | 81       | -         | S          | $V_{DS}=5V, I_D=50A$                             |

### Dynamic characteristics

| Parameter                    | Symbol       | Values |      |     | Unit | Note/Test Conditions                             |
|------------------------------|--------------|--------|------|-----|------|--------------------------------------------------|
|                              |              | Min    | Typ  | Max |      |                                                  |
| Input Capacitance            | $C_{iss}$    | -      | 3783 | -   | pF   | $V_{DS}=50V, V_{GS}=0V, f=1.0\text{MHz}$         |
| Output Capacitance           | $C_{oss}$    | -      | 988  | -   |      |                                                  |
| Reverse Transfer Capacitance | $C_{rss}$    | -      | 53   | -   |      |                                                  |
| Turn-On Delay Time           | $t_{d(on)}$  | -      | 21   | -   | ns   | $V_{DD}=50V, I_D=50A, V_{GS}=10V, R_G=2.5\Omega$ |
| Turn-On Rise Time            | $t_r$        | -      | 21   | -   |      |                                                  |
| Turn-Off Delay Time          | $t_{d(off)}$ | -      | 37   | -   |      |                                                  |
| Turn-Off Fall Time           | $t_f$        | -      | 10   | -   |      |                                                  |

### Gate charge characteristics

| Parameter          | Symbol   | Values |     |     | Unit | Note/Test Conditions              |
|--------------------|----------|--------|-----|-----|------|-----------------------------------|
|                    |          | Min    | Typ | Max |      |                                   |
| Total Gate Charge  | $Q_g$    | -      | 64  | -   | nC   | $V_{DS}=50V, I_D=50A, V_{GS}=10V$ |
| Gate-Source Charge | $Q_{gs}$ | -      | 21  | -   |      |                                   |
| Gate-Drain Charge  | $Q_{gd}$ | -      | 13  | -   |      |                                   |

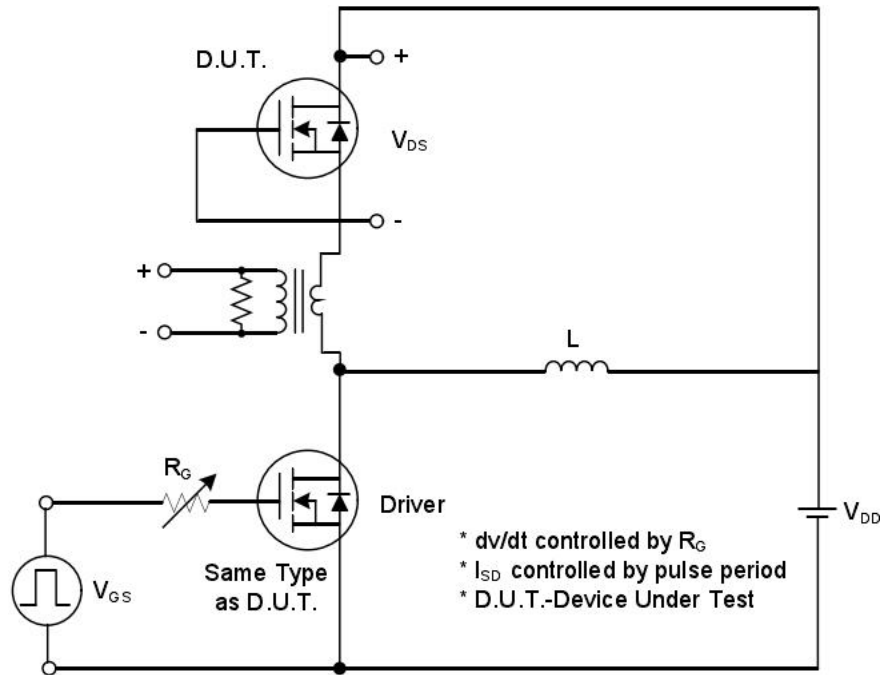
### Reverse diode

| Parameter                        | Symbol   | Values |     |     | Unit | Note/Test Conditions                                   |
|----------------------------------|----------|--------|-----|-----|------|--------------------------------------------------------|
|                                  |          | Min    | Typ | Max |      |                                                        |
| Continuous Diode Forward Current | $I_S$    | -      | -   | 140 | A    | -                                                      |
| Pulsed Diode Forward Current     | $I_{SM}$ | -      | -   | 560 | A    | -                                                      |
| Diode Forward Voltage            | $V_{SD}$ | -      | 0.8 | 1.2 | V    | $I_S=20A, V_{GS}=0V$                                   |
| Reverse Recovery Time            | $t_{rr}$ | -      | 54  | -   | ns   | $V_{DS}=50V, V_{GS}=0V, I_S=50A$<br>$di/dt=100A/\mu s$ |
| Reverse Recovery Charge          | $Q_{rr}$ | -      | 90  | -   | nC   |                                                        |

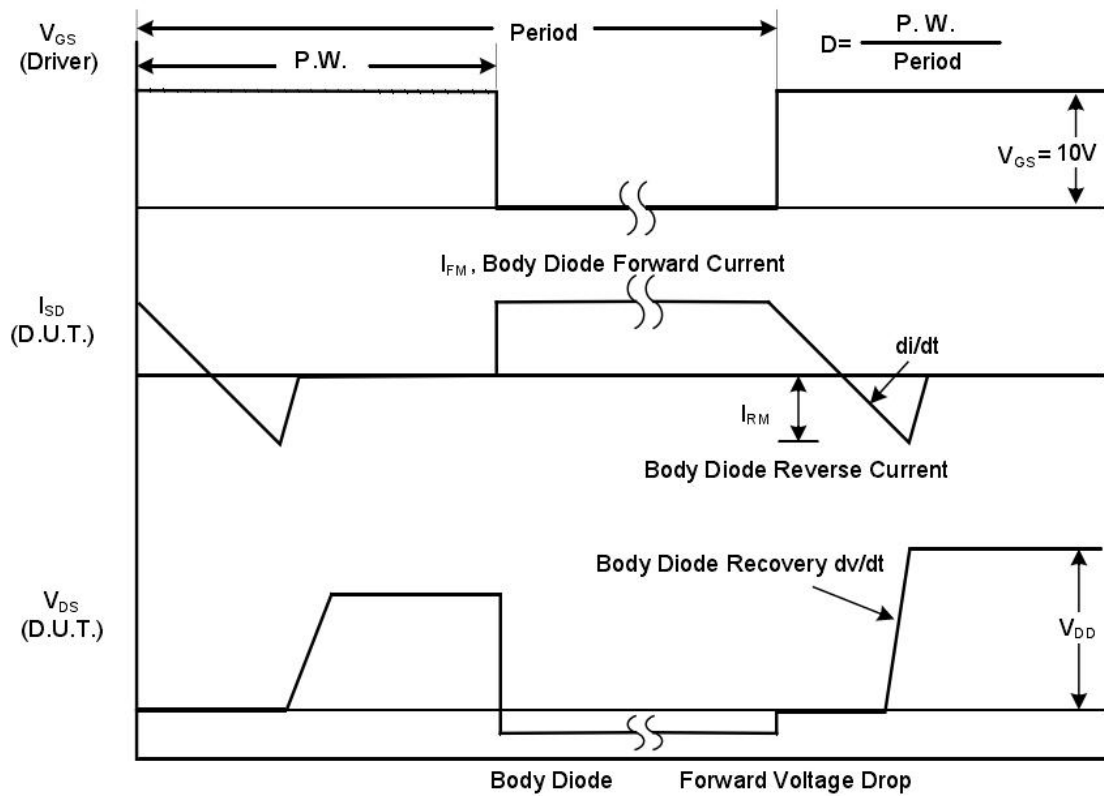
### Notes

1. Computed continuous current assumes the condition of  $T_{j\_Max}$  while the actual continuous current depends on the thermal & electro-mechanical application board design.
2. This single-pulse measurement was taken under  $T_{j\_Max} = 150^{\circ}\text{C}$ .

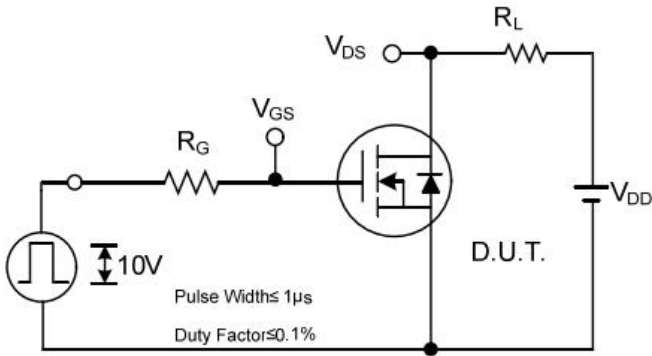
## RATING AND CHARACTERISTIC CURVES



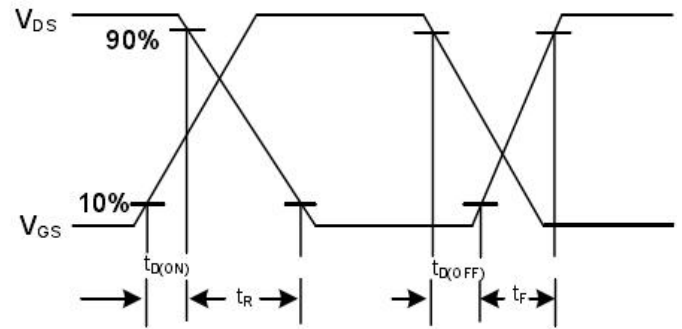
Peak Diode Recovery  $dv/dt$  Test Circuit



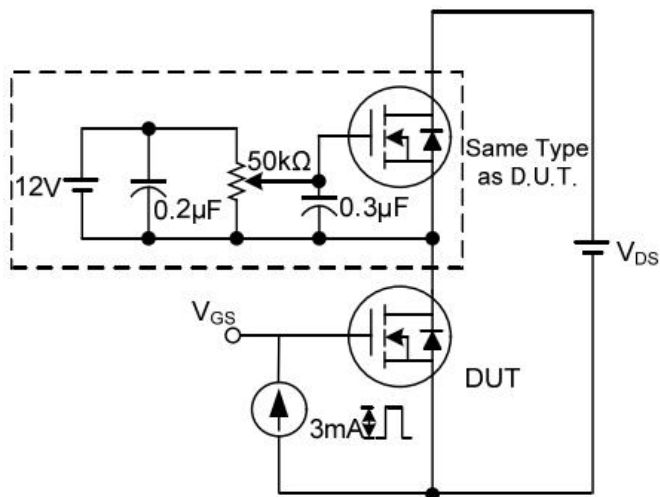
Peak Diode Recovery  $dv/dt$  Waveforms



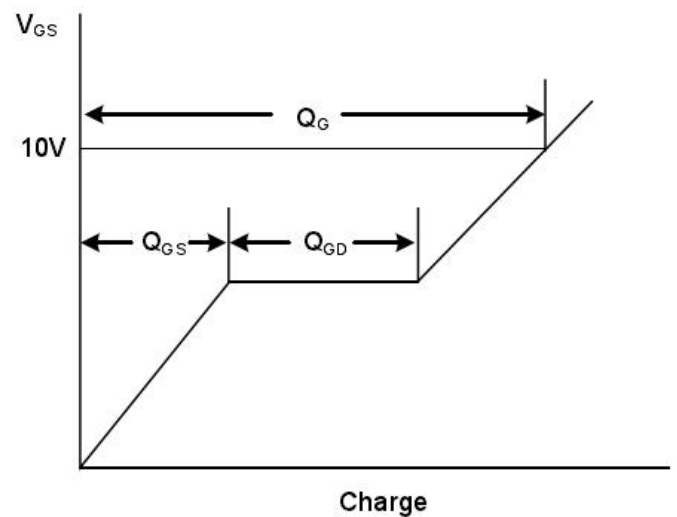
Switching Test Circuit



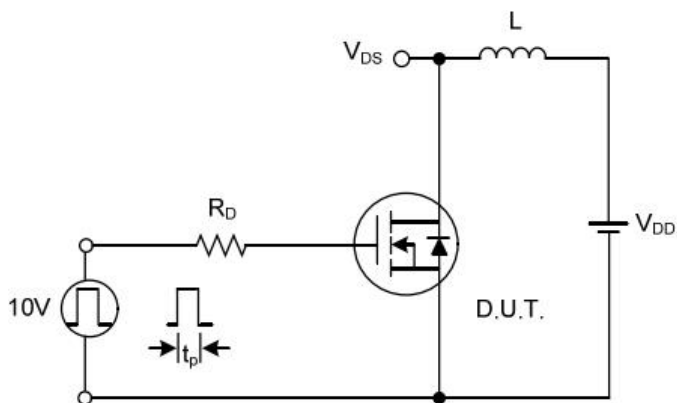
Switching Waveforms



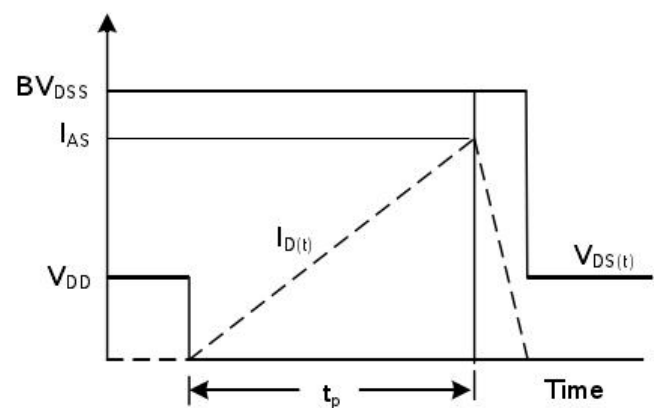
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

## RATING AND CHARACTERISTIC CURVES

Figure.1 Typical Output Characteristics

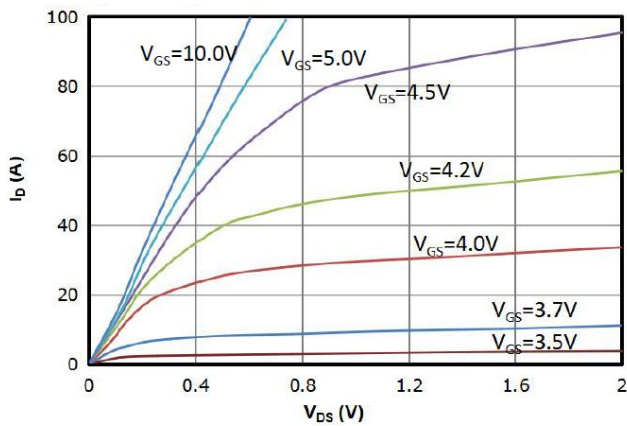


Figure.2 Transfer Characteristics

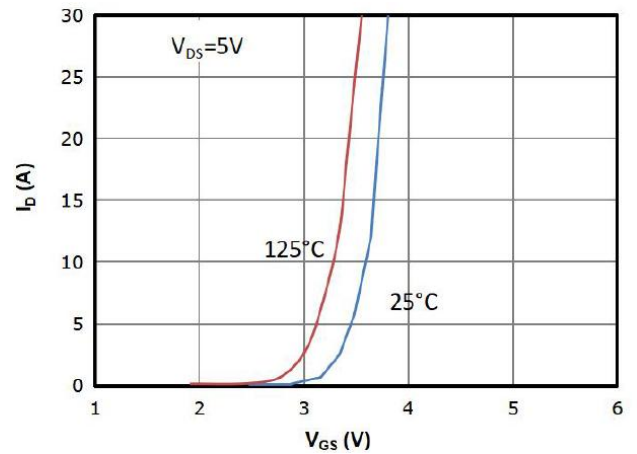


Figure.3 Rds(on) vs Drain Current and Gate Voltage

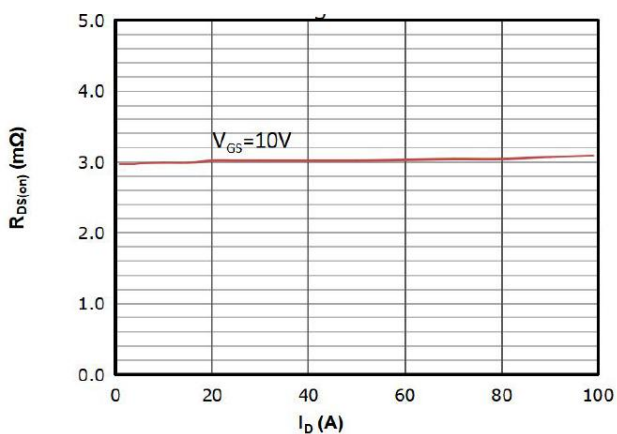


Figure.4 Rds(on) vs Gate Voltage

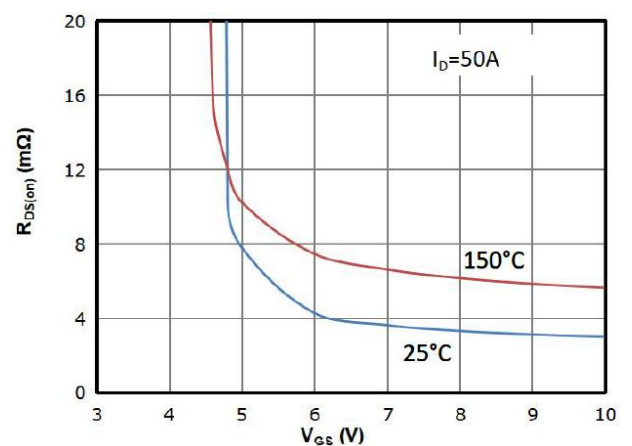


Figure.5 Rds(on) vs Temperature

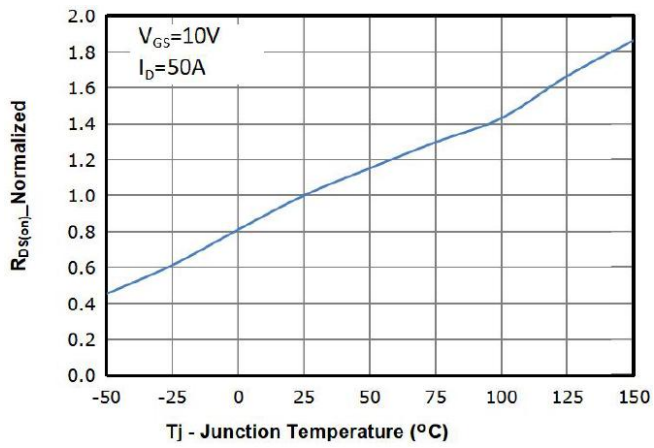


Figure.6 Vgs(th) vs Temperature

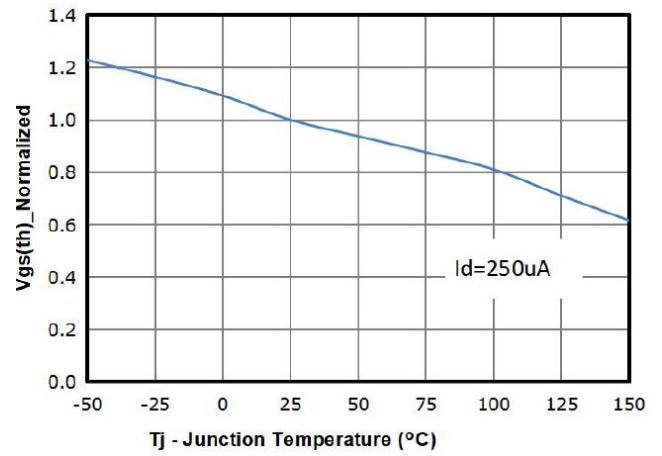


Figure.7 BVdss vs Temperature

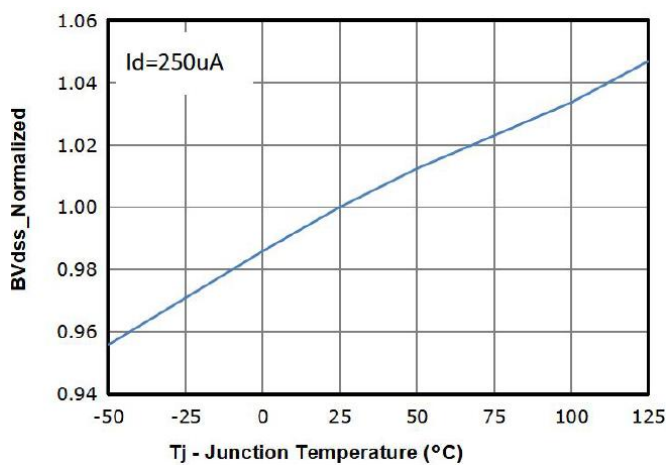
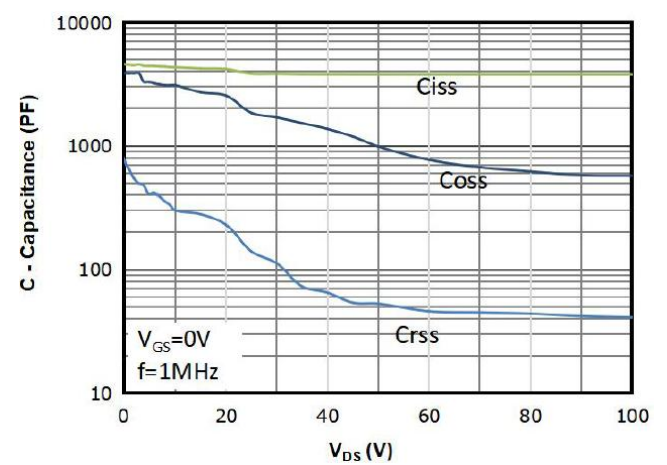


Figure.8 Capacitance Characteristics





Xfabsemi

## XC3P8N10GHV8

Figure.9 Gate Charge characteristics

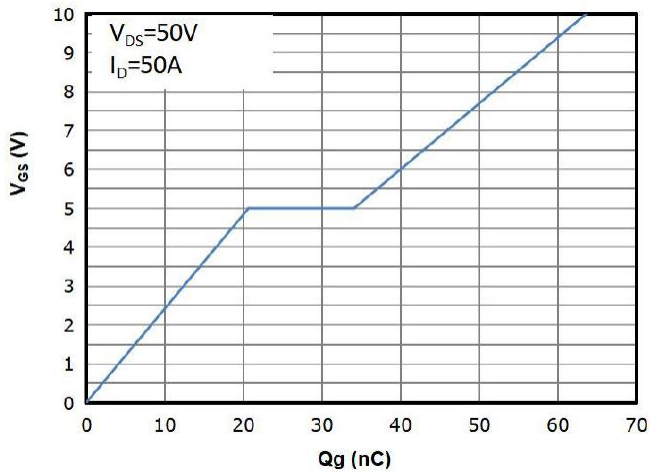


Figure.10 Body-Diode Forward Characteristics

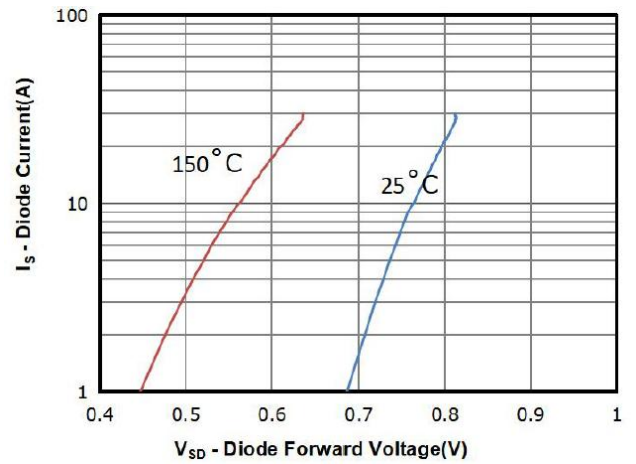


Figure.11 Power Dissipation

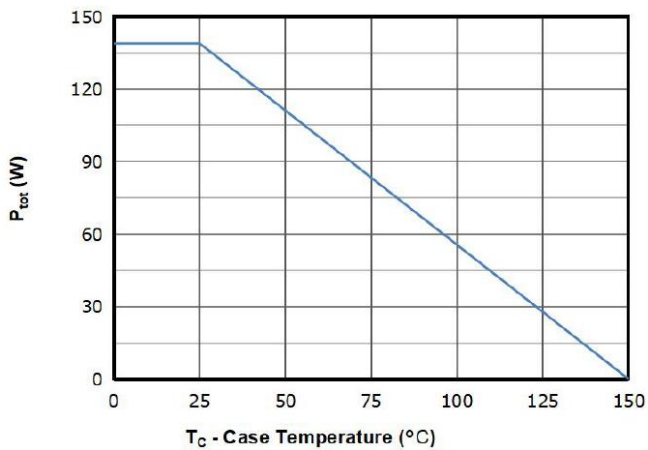


Figure.12 Drain Current Derating

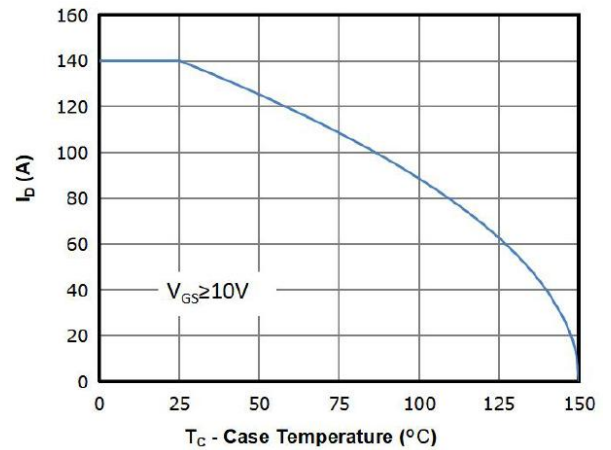


Figure.13 Safe Operating Area

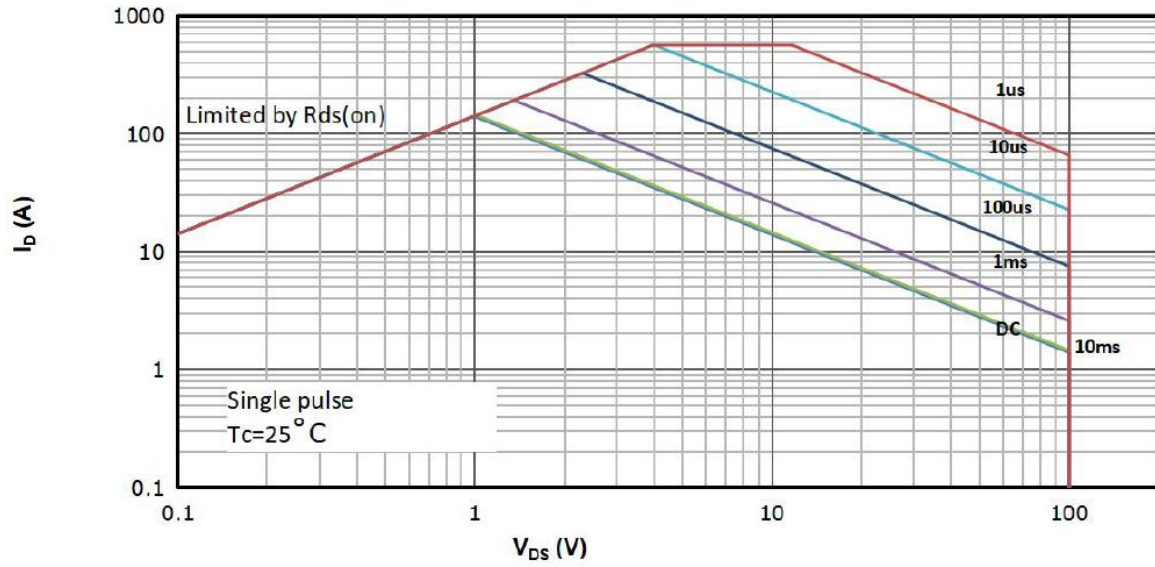
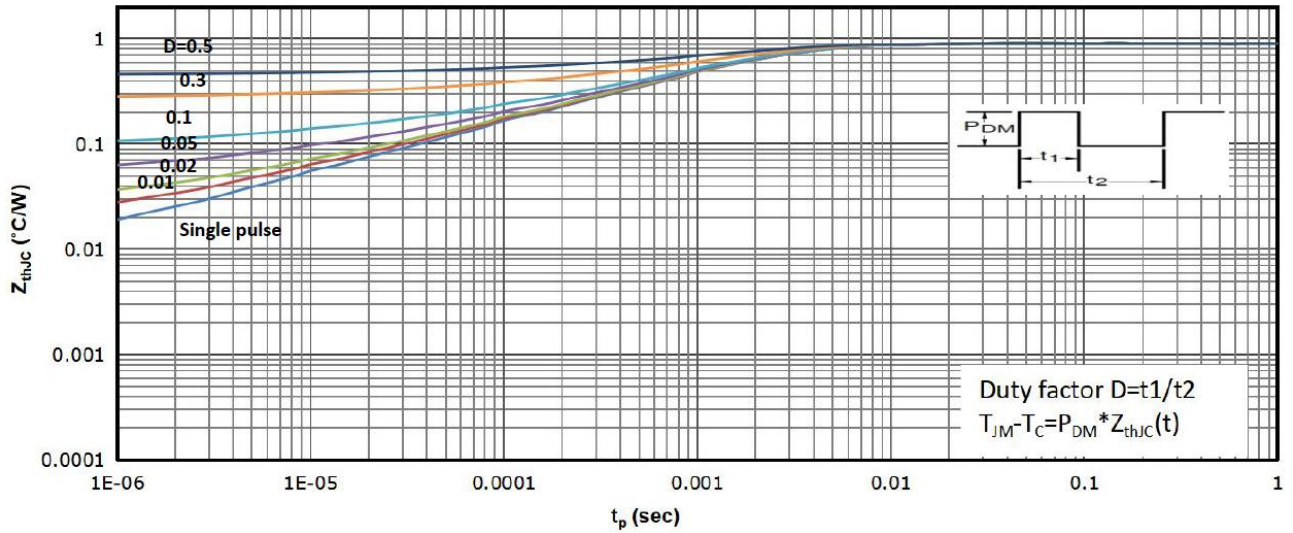
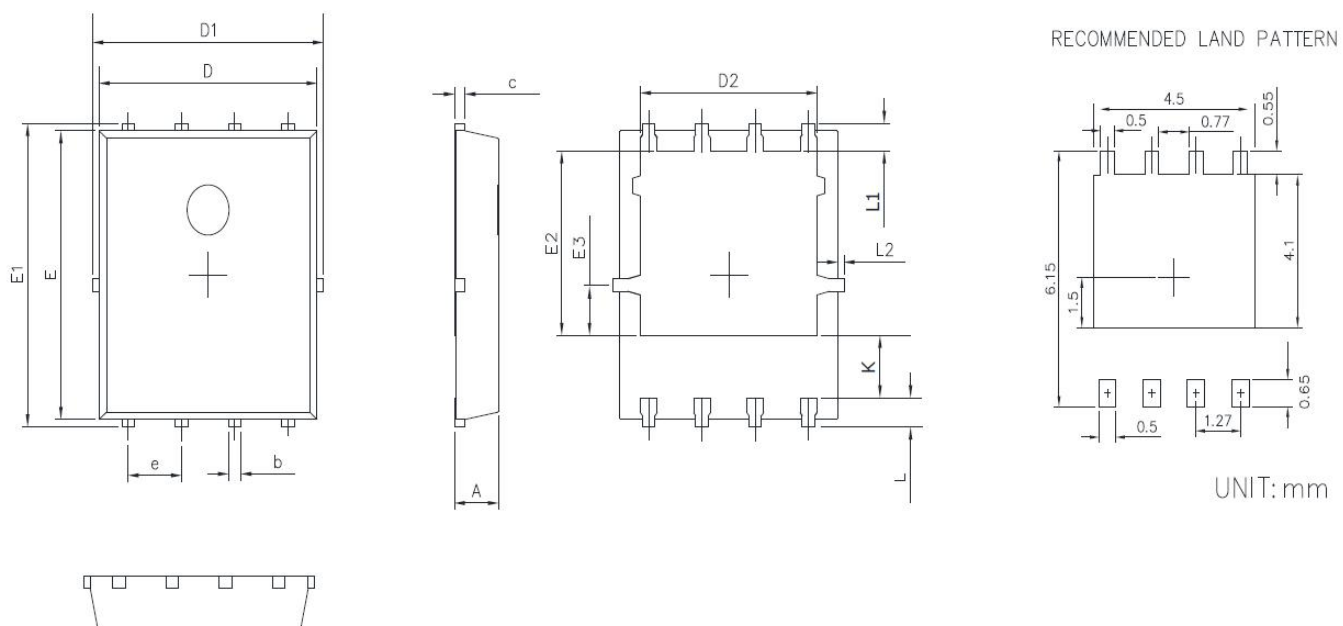


Figure.14 Max .Transient Thermal Impedance



## Package Outline: PDFN5\*6-8L



| 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 |
| 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 |