

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)TYP}$ | $I_D$ |
|---------------|-----------------|-------|
| 100V          | 70mΩ@10V        | 10A   |
|               | 85mΩ@4.5V       |       |
| -100V         | 230mΩ@-10V      | -7A   |
|               | 240mΩ@-4.5V     |       |

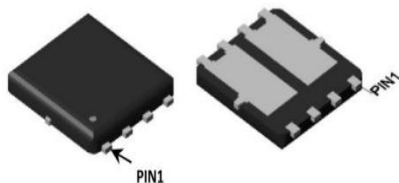
## Feature

- TrenchFET Power MOSFET
- Excellent  $R_{DS(on)}$  and Low Gate Charge
- Fast Switching Speed

## Application

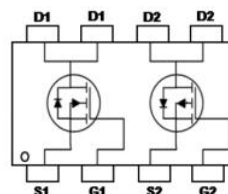
- Motor Control
- DC-DC Converters
- Power Management

## Package

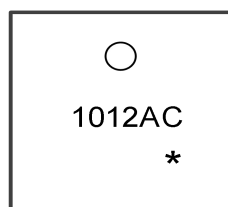


PDFN5X6-8L

## Circuit diagram



## Marking


**1012AC** = Device code

**\*** = Month Code

**Absolute maximum ratings (Ta=25°C unless otherwise noted)**

| Parameter                                   | Symbol          | Value     |           | Unit          |
|---------------------------------------------|-----------------|-----------|-----------|---------------|
|                                             |                 | N-Channel | P-Channel |               |
| Drain-Source Voltage                        | $V_{DS}$        | 100       | -100      | V             |
| Gate-Source Voltage                         | $V_{GS}$        | $\pm 20$  | $\pm 20$  | V             |
| Continuous Drain Current                    | $I_D$           | 10        | -7        | A             |
| Power Dissipation                           | $P_D$           | 17.8      | 17.8      | W             |
| Thermal Resistance from Junction to Ambient | $R_{\theta JA}$ | 7         |           | $^{\circ}C/W$ |
| Junction Temperature                        | $T_J$           | 150       |           | $^{\circ}C$   |
| Storage Temperature                         | $T_{STG}$       | -55~ +150 |           | $^{\circ}C$   |

**N-Channel Electrical characteristics (T<sub>A</sub>=25 °C, unless otherwise noted)**

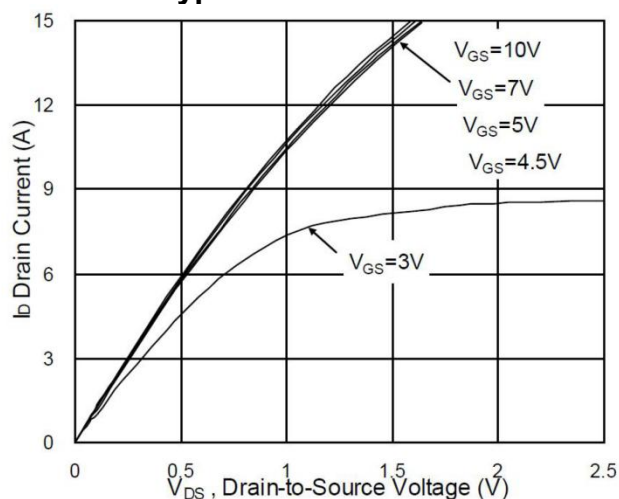
| Parameter                       | Symbol               | Test Condition                 | Min. | Typ. | Max. | Unit |
|---------------------------------|----------------------|--------------------------------|------|------|------|------|
| Static Characteristics          |                      |                                |      |      |      |      |
| Drain-source breakdown voltage  | V <sub>(BR)DSS</sub> | VGS = 0V, ID = 250μA           | 100  | -    | -    | V    |
| Zero gate voltage drain current | IDSS                 | VDS = 80V,VGS = 0V             | -    | -    | 1    | μA   |
| Gate-body leakage current       | IGSS                 | VGS =±20V, VDS = 0V            | -    | -    | ±0.1 | μA   |
| Gate threshold voltage          | VGS(th)              | VDS =VGS, ID = 250μA           | 1.0  | 1.8  | 2.5  | V    |
| Drain-source on-resistance      | RDS(on)              | VGS = 10V, ID = 2A             | -    | 70   | 88   | mΩ   |
|                                 |                      | VGS = 4.5V, ID = 1A            | -    | 85   | 115  |      |
| Dynamic characteristics         |                      |                                |      |      |      |      |
| Input Capacitance               | Ciss                 | VDS=15V , VGS=0V , f=1MHz      | -    | 1100 | -    | pF   |
| Output Capacitance              | Coss                 |                                | -    | 55   | -    |      |
| Reverse Transfer Capacitance    | Crss                 |                                | -    | 40   | -    |      |
| Switching Characteristics       |                      |                                |      |      |      |      |
| Total gate charge               | Qg                   | VDS=80V , VGS=10V , ID=2A      | -    | 12   | -    | nC   |
| Gate-source charge              | Qgs                  |                                | -    | 2.9  | -    |      |
| Gate-drain charge               | Qgd                  |                                | -    | 1.8  | -    |      |
| Turn-on delay time              | td(on)               | VDD=50V , VGS=10V , RG=3 ID=2A | -    | 3.9  | -    | ns   |
| Turn-on rise time               | tr                   |                                | -    | 26   | -    |      |
| Turn-off delay time             | td(off)              |                                | -    | 16.2 | -    |      |
| Turn-off fall time              | tf                   |                                | -    | 8.9  | -    |      |
| Diode Characteristics           |                      |                                |      |      |      |      |
| Diode Forward Voltage           | VSD                  | VGS=0V , IS=1A , TJ=25℃        | -    | -    | 1.2  | v    |

**P-Channel Electrical characteristics (T<sub>A</sub>=25 °C, unless otherwise noted)**

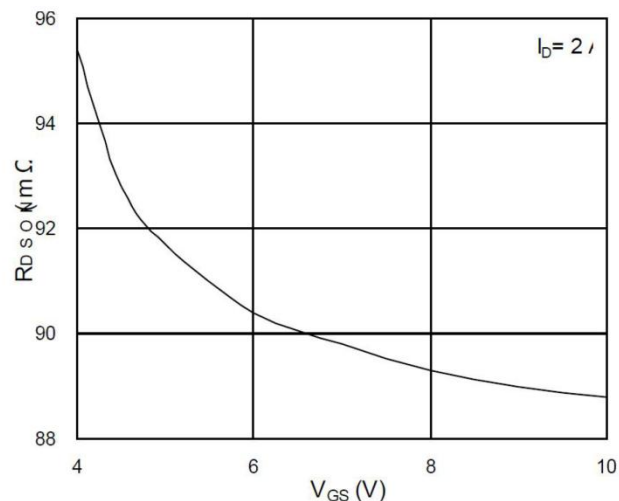
| Parameter                          | Symbol               | Test Condition                                                               | Min. | Typ. | Max. | Unit |
|------------------------------------|----------------------|------------------------------------------------------------------------------|------|------|------|------|
| Static Characteristics             |                      |                                                                              |      |      |      |      |
| Drain-source breakdown voltage     | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0V, I <sub>D</sub> =-250μA                                 | -100 | -    | -    | V    |
| Zero gate voltage drain current    | I <sub>DSS</sub>     | V <sub>DS</sub> = -80V,V <sub>GS</sub> = 0V                                  | -    | -    | -1   | μA   |
| Gate-body leakage current          | I <sub>GSS</sub>     | V <sub>GS</sub> =±20V, V <sub>DS</sub> = 0V                                  | -    | -    | ±100 | nA   |
| Gate threshold voltage             | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA                    | -1   | -1.8 | -2.5 | V    |
| Drain-source on-resistance         | R <sub>DS(on)</sub>  | V <sub>GS</sub> =-10V, I <sub>D</sub> =-2A                                   | -    | 230  | 290  | mΩ   |
|                                    |                      | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-1A                                  | -    | 240  | 320  |      |
| Dynamic characteristics            |                      |                                                                              |      |      |      |      |
| Input Capacitance                  | C <sub>iss</sub>     | V <sub>DS</sub> =-15V,<br>V <sub>GS</sub> =0V,f=1MHz                         | -    | 1239 | -    | pF   |
| Output Capacitance                 | C <sub>oss</sub>     |                                                                              | -    | 42   | -    |      |
| Reverse Transfer Capacitance       | C <sub>rss</sub>     |                                                                              | -    | 29   | -    |      |
| Switching Characteristics          |                      |                                                                              |      |      |      |      |
| Turn-on delay time                 | t <sub>d(on)</sub>   | V <sub>DD</sub> =-50V,ID=-2A,<br>V <sub>GS</sub> =-10V,R <sub>GEN</sub> =10Ω | -    | 9.1  | -    | ns   |
| Turn-on rise time                  | t <sub>r</sub>       |                                                                              | -    | 14.8 | -    |      |
| Turn-off delay time                | t <sub>d(off)</sub>  |                                                                              | -    | 57   | -    |      |
| Turn-off fall time                 | t <sub>f</sub>       |                                                                              | -    | 14   | -    |      |
| Total gate charge                  | Q <sub>g</sub>       | V <sub>DS</sub> =-60V,V <sub>GS</sub> =-10V,<br>I <sub>D</sub> =-2A          | -    | 25   | -    | nC   |
| Gate-source charge                 | Q <sub>gs</sub>      |                                                                              | -    | 5    | -    |      |
| Gate-drain charge                  | Q <sub>gd</sub>      |                                                                              | -    | 7    | -    |      |
| Source-Drain Diode Characteristics |                      |                                                                              |      |      |      |      |
| Body Diode Voltage                 | V <sub>SD</sub>      | I <sub>S</sub> =-1A, V <sub>GS</sub> = 0V                                    | -    | -    | -1.2 | V    |



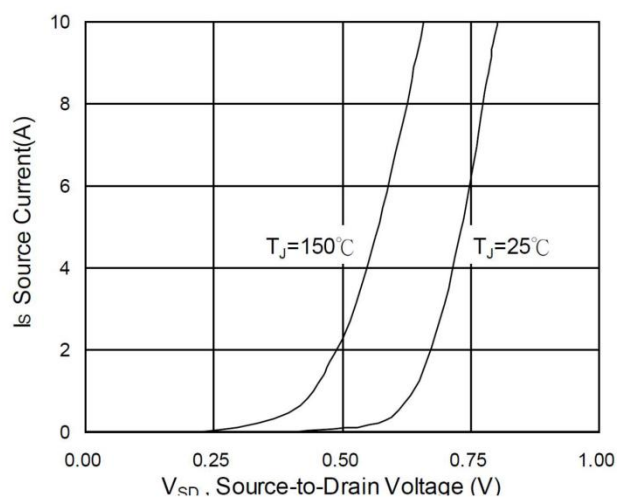
## N-Channel Typical Characteristics



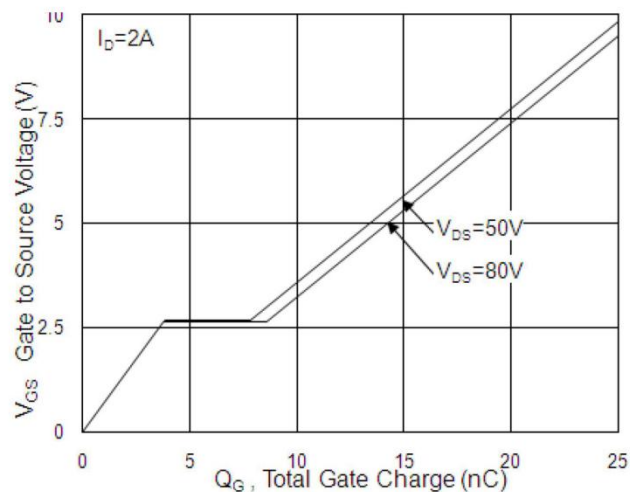
Typical Output Characteristics



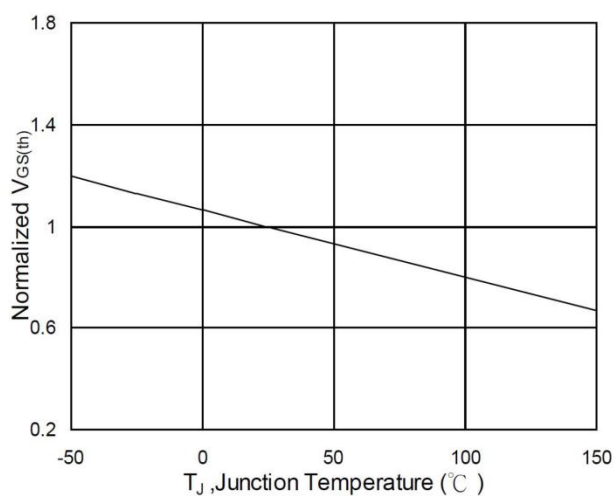
On-Resistance vs. Gate-Source



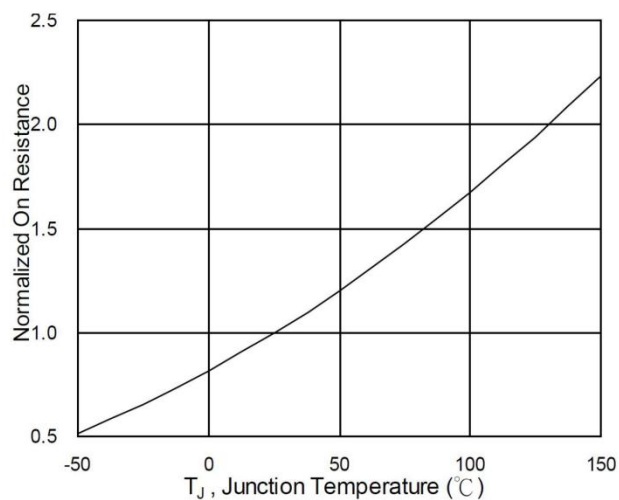
Forward Characteristics Of Reverse



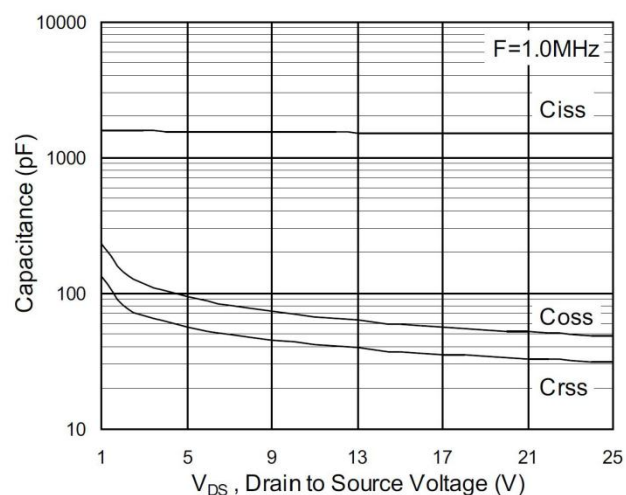
Gate-Charge Characteristics



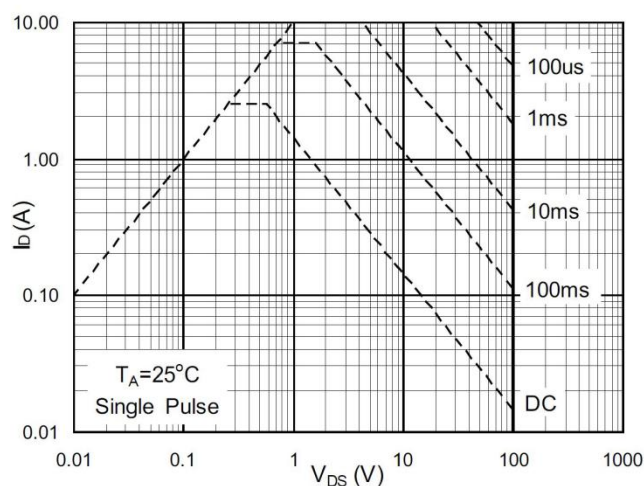
Normalized  $V_{GS(th)}$  vs.  $T_J$



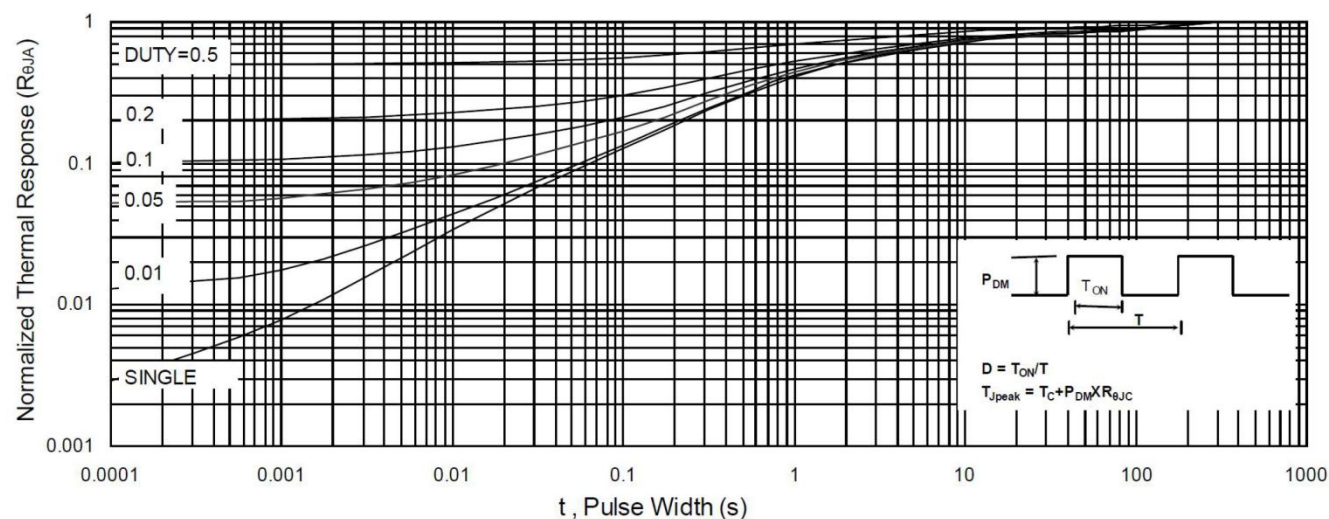
Normalized  $R_{DS(on)}$  vs.  $T_J$



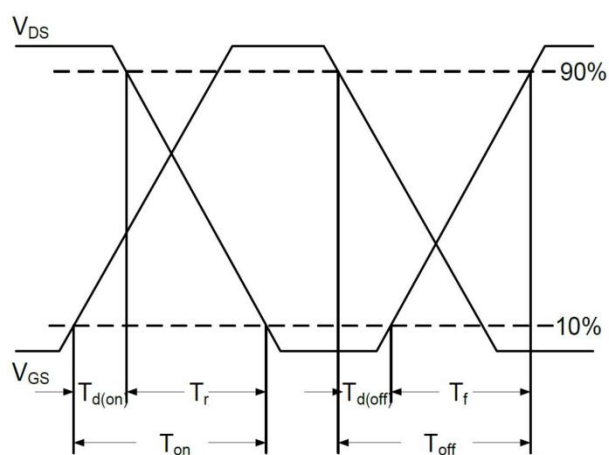
Capacitance



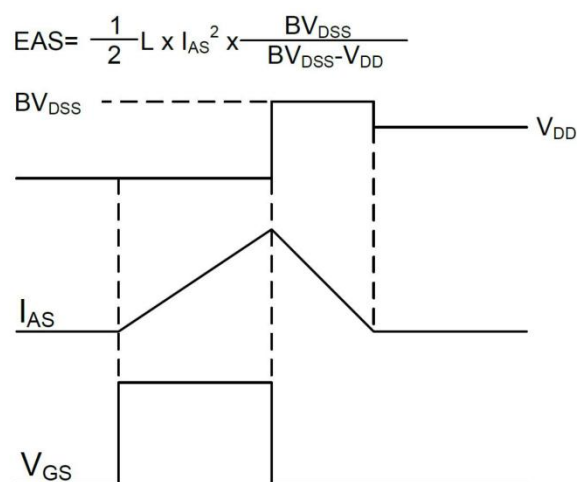
Safe Operating Area



Normalized Maximum Transient Thermal Impedance



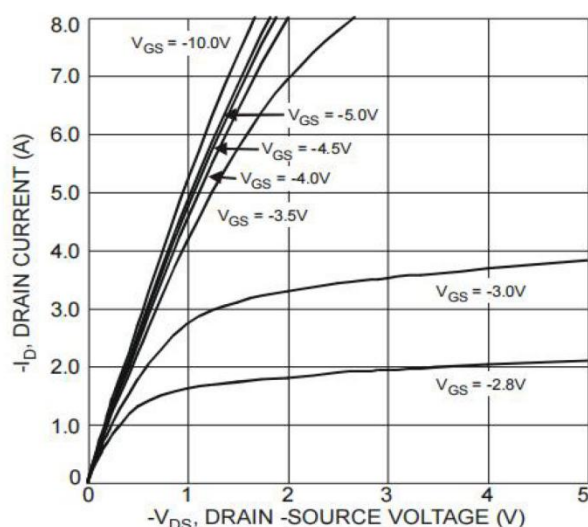
Switching Time Waveform



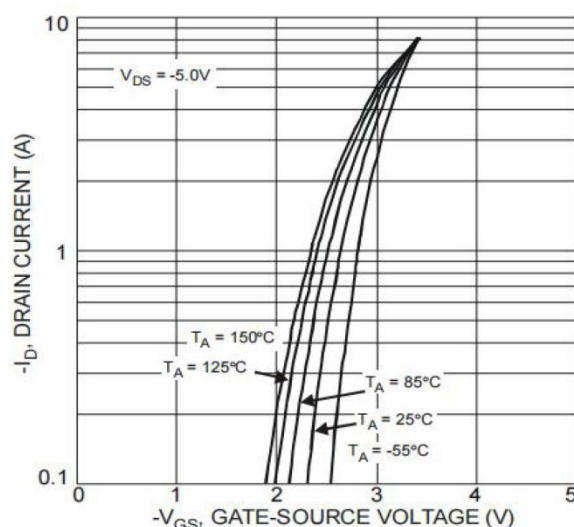
Unclamped Inductive Switching Waveform



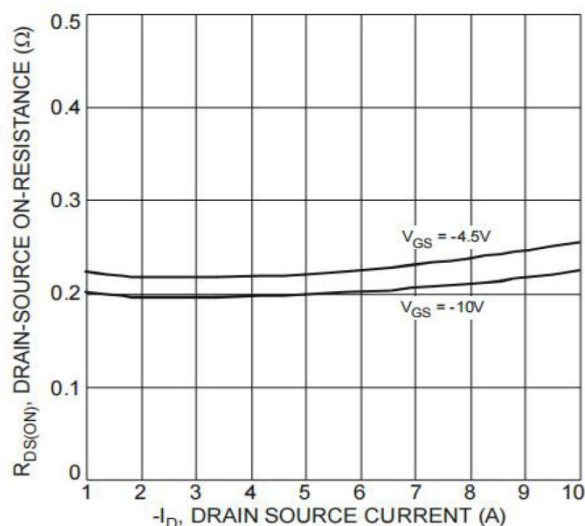
## P-Channel Typical Characteristics



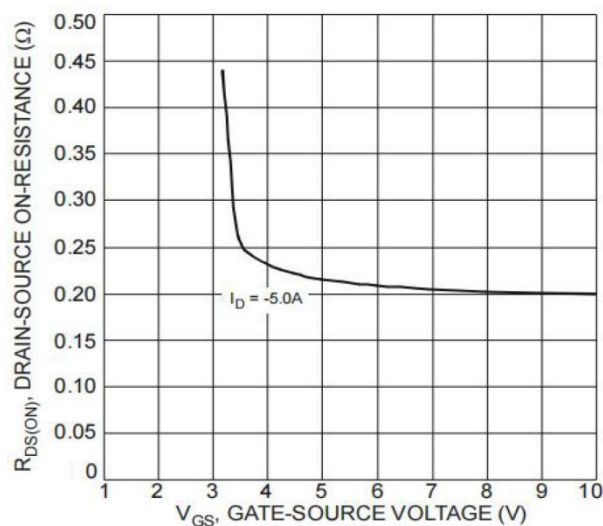
Typical Output Characteristics



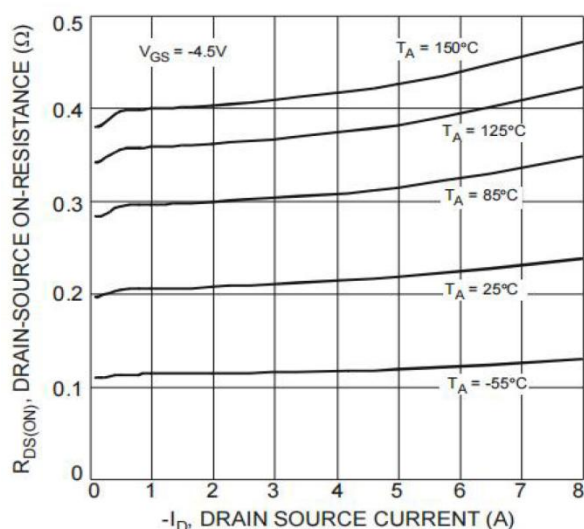
Transfer Characteristics



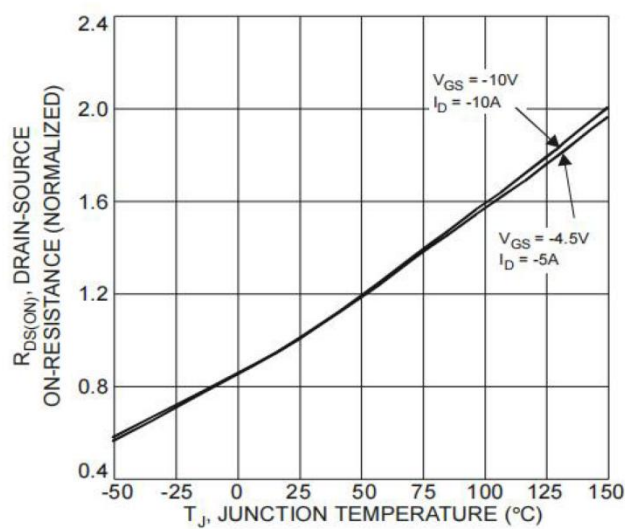
On-Resistance vs. Drain Current and Gate Voltage



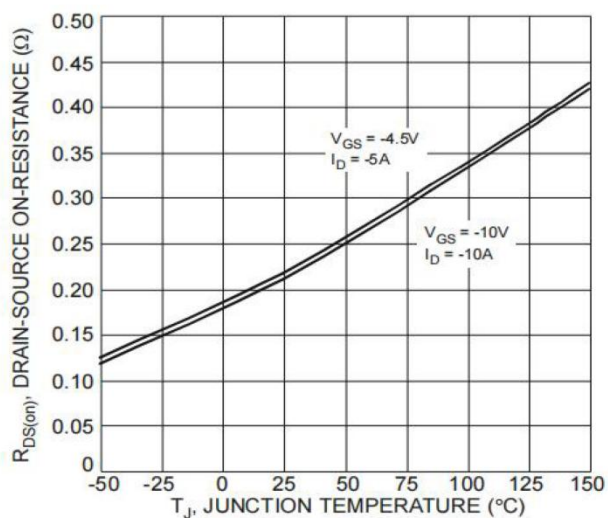
Drain-Source On-Resistance vs. Gate-Source Voltage



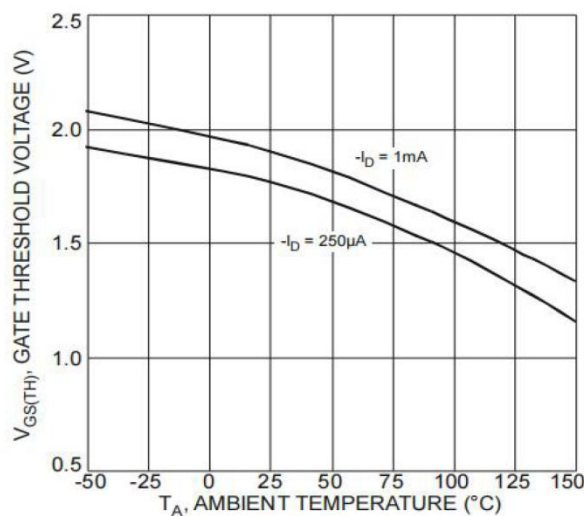
On-Resistance vs. Drain Current and Temperature



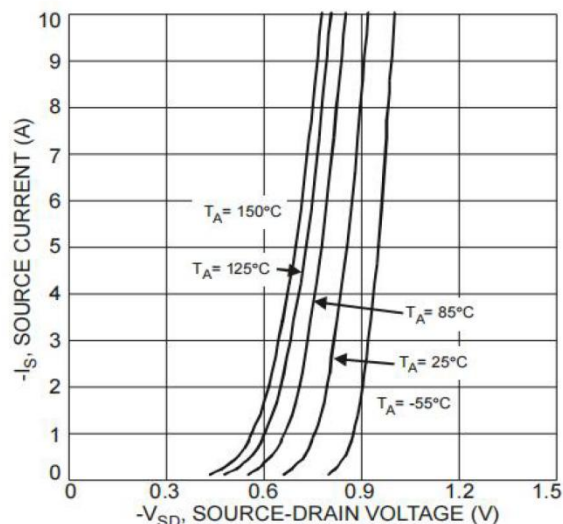
On-Resistance Variation with Temperature



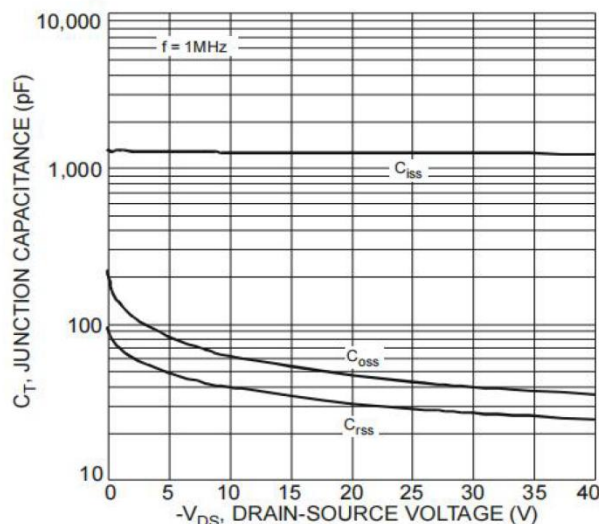
On-Resistance Variation with Temperature



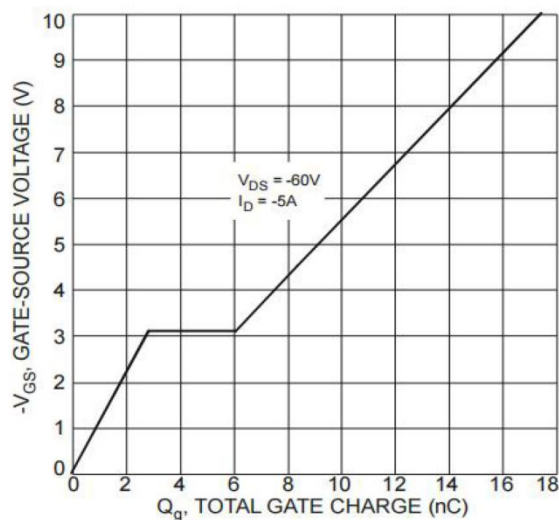
Gate Threshold Variation vs. Ambient Temperature



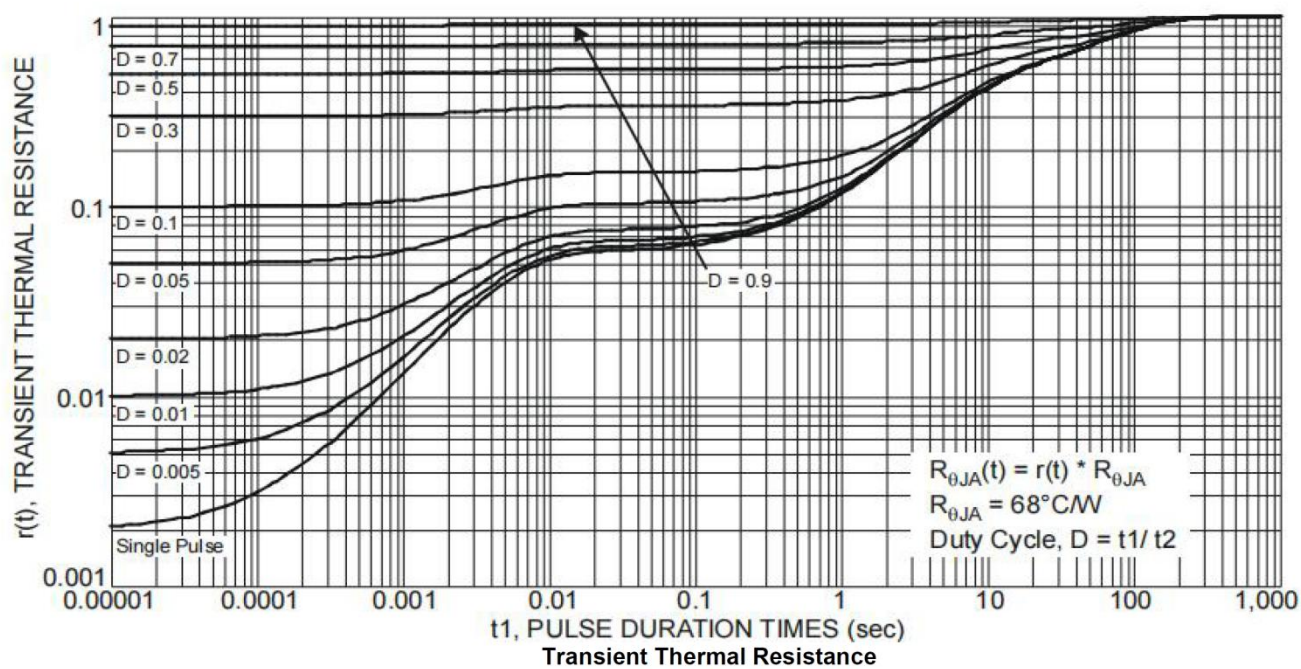
Diode Forward Voltage vs. Current



Typical Junction Capacitance

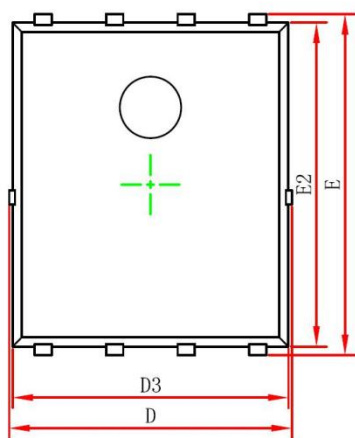


Gate-Charge Characteristics

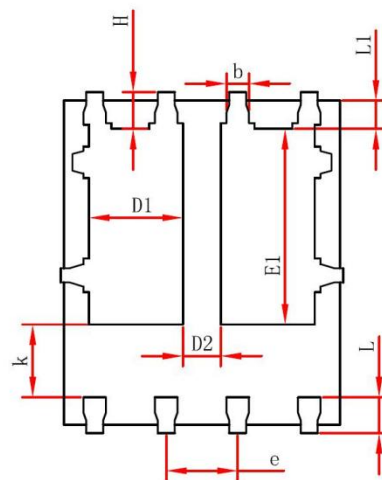




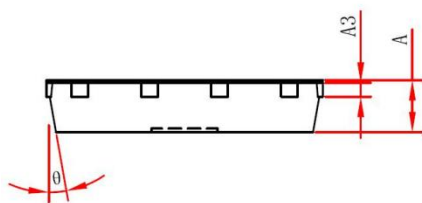
PDFN5X6-8L Package Information



Top View  
[顶视图]



Bottom View  
[背视图]



Side View  
[侧视图]

| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 0.900                     | 1.000 | 0.035                | 0.039 |
| A3     | 0.254 REF.                |       | 0.010REF.            |       |
| D      | 4.944                     | 5.096 | 0.195                | 0.201 |
| E      | 5.974                     | 6.126 | 0.235                | 0.241 |
| D1     | 1.470                     | 1.870 | 0.058                | 0.074 |
| D2     | 0.470                     | 0.870 | 0.019                | 0.034 |
| E1     | 3.375                     | 3.575 | 0.133                | 0.141 |
| D3     | 4.824                     | 4.976 | 0.190                | 0.196 |
| E2     | 5.674                     | 5.826 | 0.223                | 0.229 |
| k      | 1.190                     | 1.390 | 0.047                | 0.055 |
| b      | 0.350                     | 0.450 | 0.014                | 0.018 |
| e      | 1.270TYP.                 |       | 0.050TYP.            |       |
| L      | 0.559                     | 0.711 | 0.022                | 0.028 |
| L1     | 0.424                     | 0.576 | 0.017                | 0.023 |
| H      | 0.574                     | 0.726 | 0.023                | 0.029 |
| θ      | 10°                       | 12°   | 10°                  | 12°   |