## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)TYP}$ | $I_D$ |
|---|---|---|
| 60V | 23mΩ@10V | 20A |
| | 30mΩ@4.5V | |
| -60V | 30mΩ@-10V | -35A |
| | 35mΩ@-4.5V | |

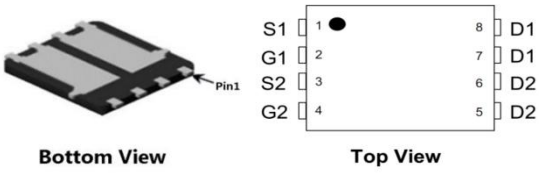
## Feature

- TrenchFET Power MOSFET
- Excellent RDS(on) and Low Gate Charge
- Fast Switching Speed

## Application

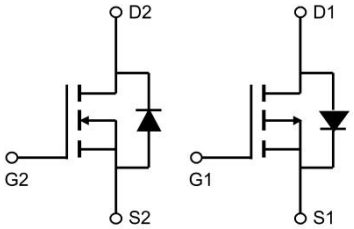
- Motor Control
- DC-DC Converters
- Power Management

## Package

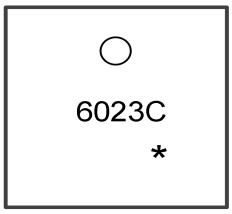



**PDFN5×6-8L**

## Circuit diagram




## Marking




**6023C = Device code**

*** = Month Code**

## Absolute maximum ratings (Ta=25℃ unless otherwise noted)

| Parameter | Symbol | Value | | Unit |
|---|---|---|---|---|
| | | N-Channel | P-Channel | |
| Drain-Source Voltage | $V_{DS}$ | 60 | -60 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | ±20 | V |
| Continuous Drain Current | $I_D$ | 20 | -35 | A |
| Power Dissipation | $P_D$ | 85 | 50 | W |
| Single pulsed avalanche energy Note1 | $E_{AS}$ | 40 | 115 | mJ |
| Thermal Resistance from Junction to Ambient | $R_{\theta JA}$ | 1.47 | 2.5 | ℃/W |
| Junction Temperature | $T_J$ | 150 | | ℃ |
| Storage Temperature | $T_{STG}$ | -55~ +150 | | ℃ |

## N-Channel Electrical characteristics ($T_A$=25 °C, unless otherwise noted)

| Parameter | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | VGS = 0V, ID = 250μA | 60 | - | - | V |
| Zero gate voltage drain current | $I_{DSS}$ | VDS = 80V,VGS = 0V | - | - | 1 | μA |
| Gate-body leakage current | $I_{GSS}$ | VGS =±20V, VDS = 0V | - | - | ±0.1 | μA |
| Gate threshold voltage | $V_{GS(th)}$ | VDS =VGS, ID = 250μA | 1.0 | 1.6 | 2.5 | V |
| Drain-source on-resistance | $R_{DS(on)}$ | VGS = 10V, ID = 2A | - | 23 | 29 | mΩ |
| | | VGS = 4.5V, ID = 1A | - | 30 | 40 | |
| **Dynamic characteristics** | | | | | | |
| Input Capacitance | $C_{iss}$ | VDS=15V , VGS=0V , f=1MHz | - | 1640 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 120 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 126 | - | |
| **Switching Characteristics** | | | | | | |
| Total gate charge | $Q_g$ | VDS=48V , VGS=4.5V , ID=10A | - | 42 | - | nC |
| Gate-source charge | $Q_{gs}$ | | - | 8 | - | |
| Gate-drain charge | $Q_{gd}$ | | - | 11.5 | - | |
| Turn-on delay time | $t_{d(on)}$ | VDD=30V , VGS=10V , RG=3.3W, ID=10A | --- | 9 | - | ns |
| Turn-on rise time | $t_r$ | | --- | 10.5 | - | |
| Turn-off delay time | $t_{d(off)}$ | | --- | 36 | - | |
| Turn-off fall time | $t_f$ | | --- | 5 | - | |
| **Diode Characteristics** | | | | | | |
| Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V , $I_S$=1A , $T_J$=25℃ | - | - | 1.2 | V |

## P-Channel Electrical characteristics ($T_A$=25 °C, unless otherwise noted)

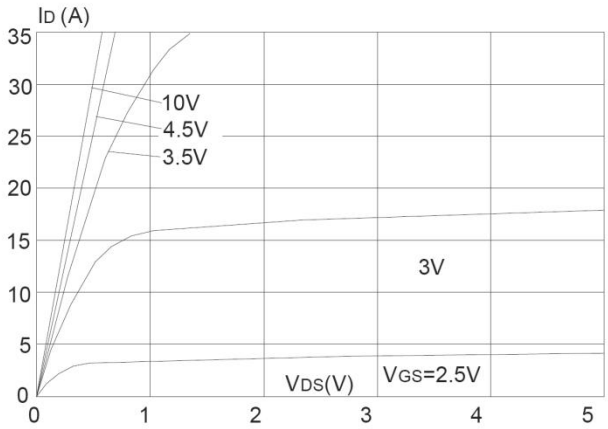
| Parameter | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ =-250μA | -60 | - | - | V |
| Zero gate voltage drain current | $I_{DSS}$ | $V_{DS}$ = -80V,$V_{GS}$ = 0V | - | - | -1 | μA |
| Gate-body leakage current | $I_{GSS}$ | $V_{GS}$ =±20V, $V_{DS}$ = 0V | - | - | ±100 | nA |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}$ =$V_{GS}$, $I_D$ =-250μA | -1 | -1.7 | -2.5 | V |
| Drain-source on-resistance | $R_{DS(on)}$ | $V_{GS}$ =-10V, $I_D$ =-2A | - | 30 | 38 | mΩ |
| | | $V_{GS}$ =-4.5V, $I_D$ =-1A | - | 36 | 48 | |
| **Dynamic characteristics** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ =-30V, $V_{GS}$ =0V, f = 1MHz | - | 2417 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 179 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 120 | - | |
| **Switching Characteristics** | | | | | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$ =-30V, $R_L$ = 4.7Ω $V_{GEN}$ =-10V,$R_{GEN}$ = 3Ω | - | 9.8 | - | ns |
| Turn-on rise time | $t_r$ | | - | 6.1 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 44 | - | |
| Turn-off fall time | $t_f$ | | - | 12.7 | - | |
| Total gate charge | $Q_g$ | $V_{DS}$ =-30V, $V_{GS}$ =-10V, $I_D$ =-6.2A | - | 46.5 | - | nC |
| Gate-source charge | $Q_{gs}$ | | - | 9.1 | - | |
| Gate-drain charge | $Q_{gd}$ | | - | 9.2 | - | |
| **Source-Drain Diode Characteristics** | | | | | | |
| Body Diode Voltage | $V_{SD}$ | $I_S$=-1A, $V_{GS}$ = 0V | - | - | -1.2 | V |

Note:

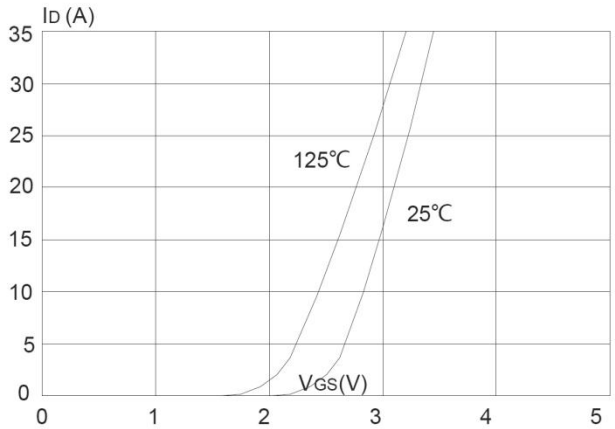
1. $E_{AS}$ is tested at starting Tj = 25℃, $V_{DD}$=30V,$V_{GS}$ = 10V,L = 0.1mH, Rg=25mΩ;

## N-Channel Typical Characteristics

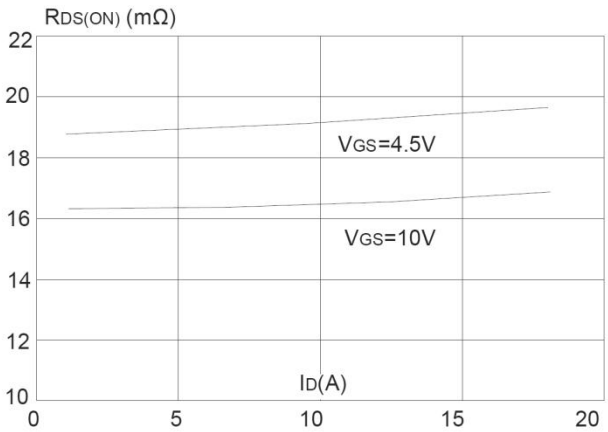
Output Characteristics



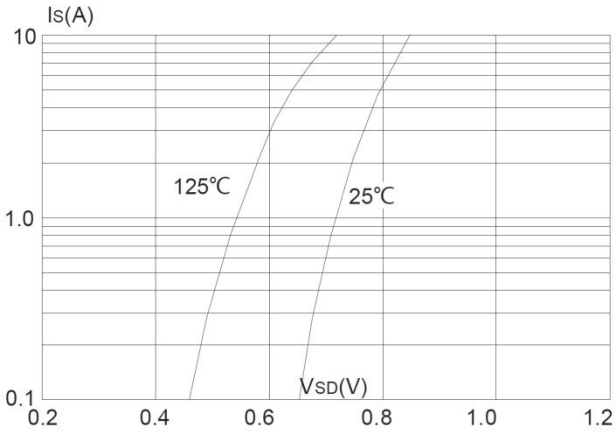

Typical Transfer Characteristics



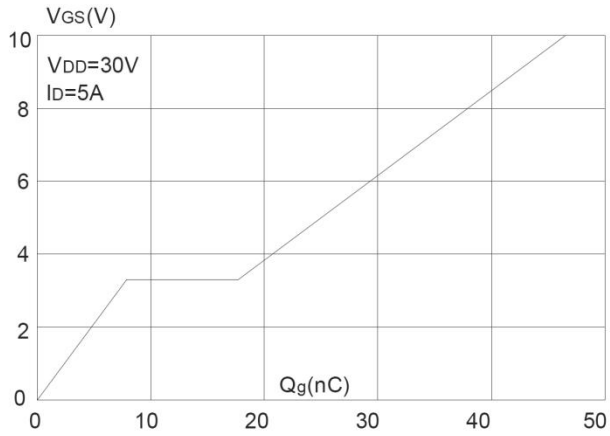

On-resistance vs. Drain Current



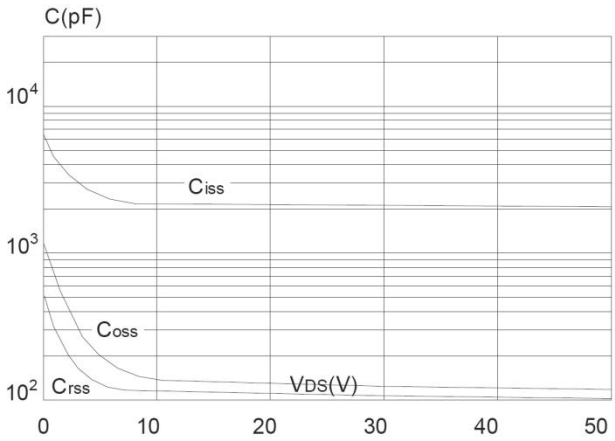

Body Diode Characteristics



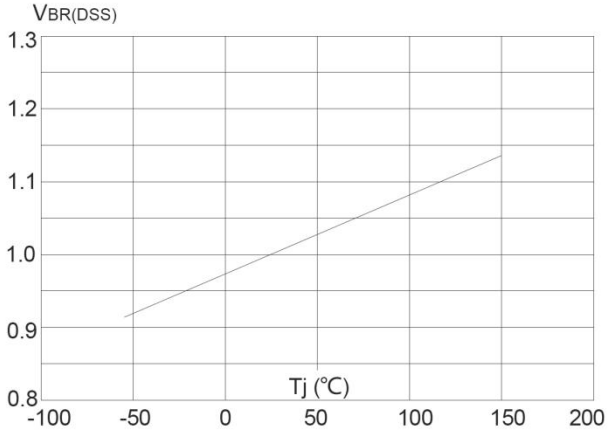

Gate Charge Characteristics



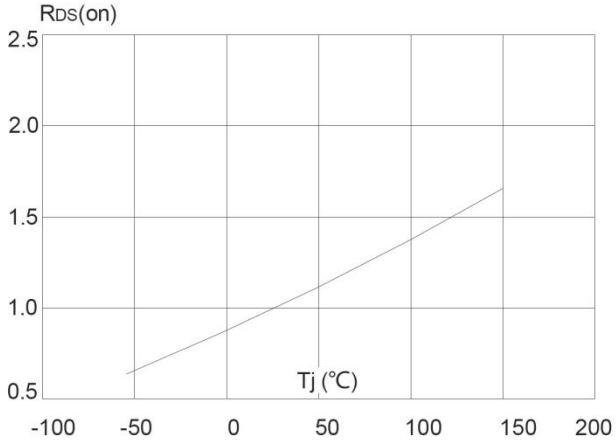

Capacitance Characteristics



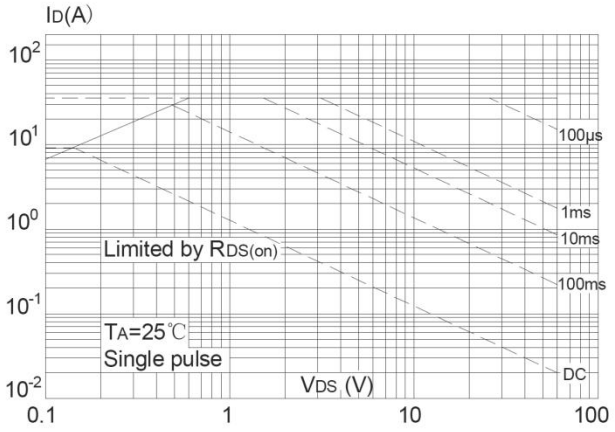
Normalized Breakdown Voltage vs. Junction Temperature



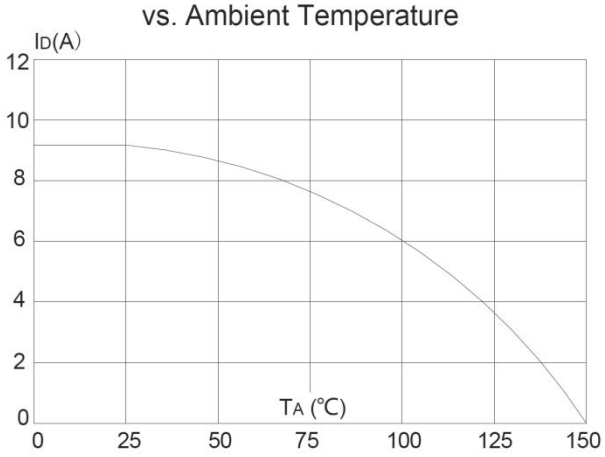

Normalized on Resistance vs. Junction Temperature



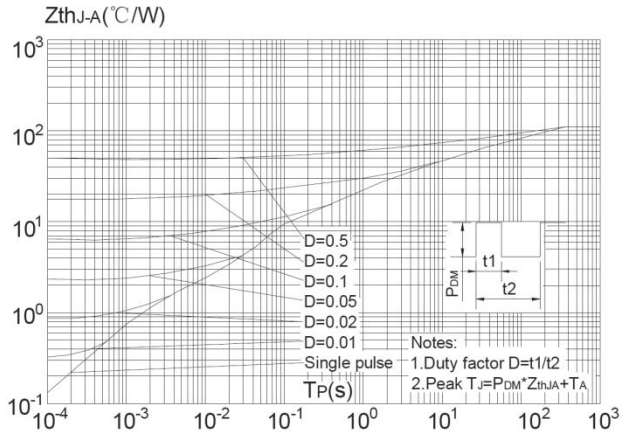

Maximum Safe Operating Area




Maximum Continuous Drain Current vs. Ambient Temperature




Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



## P-Channel Typical Characteristics

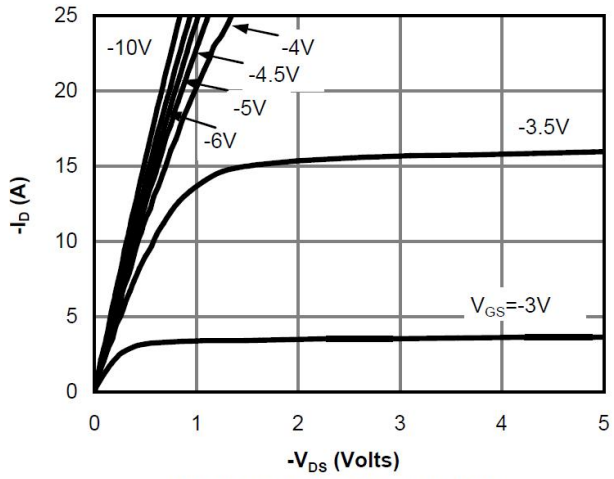



Fig 1: On-Region Characteristics

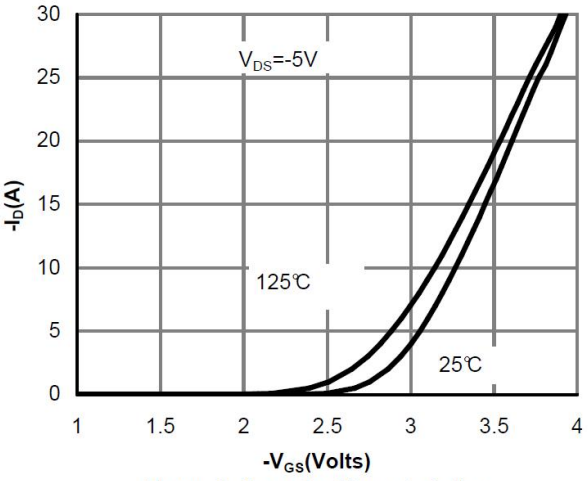



Figure 2: Transfer Characteristics

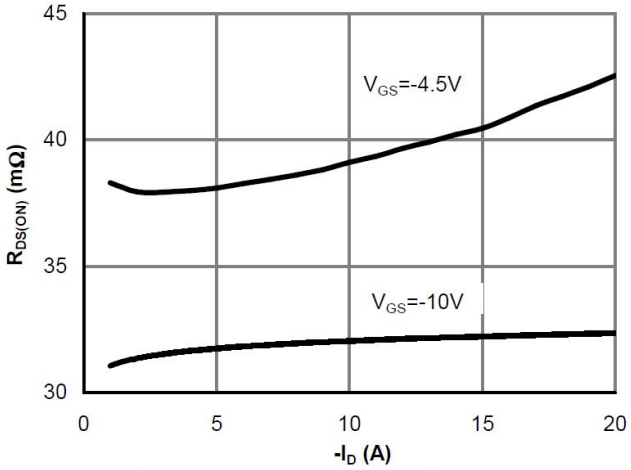



Figure 3: On-Resistance vs. Drain Current and Gate Voltage

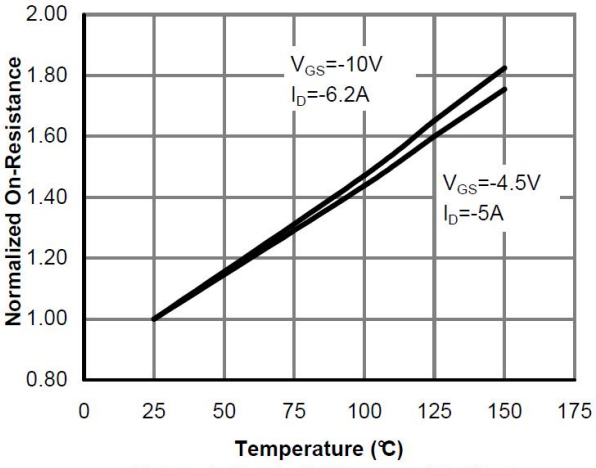



Figure 4: On-Resistance vs. Junction Temperature

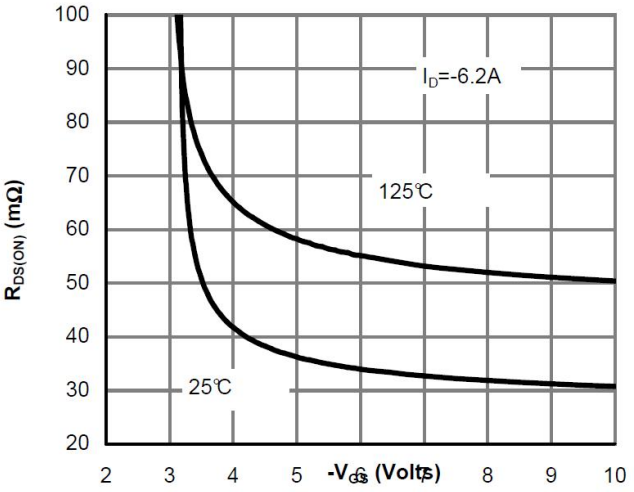



Figure 5: On-Resistance vs. Gate-Source Voltage

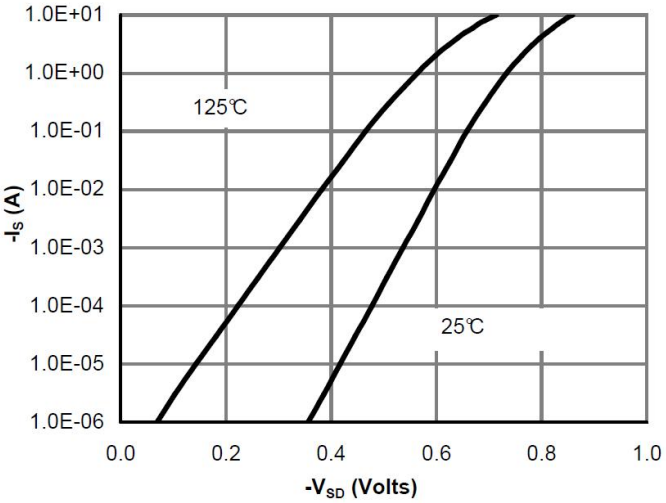



Figure 6: Body-Diode Characteristics

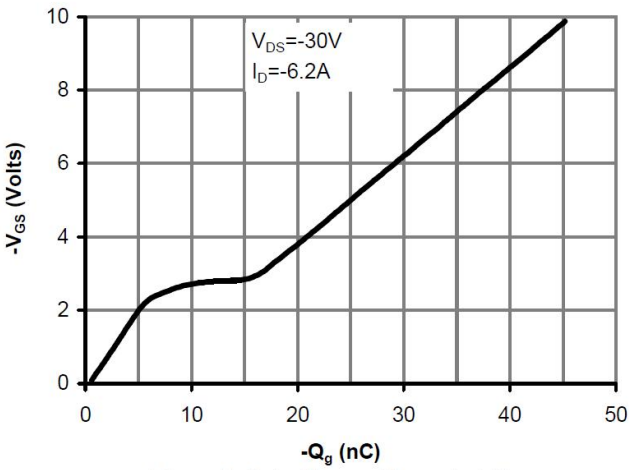



Figure 7: Gate-Charge Characteristics

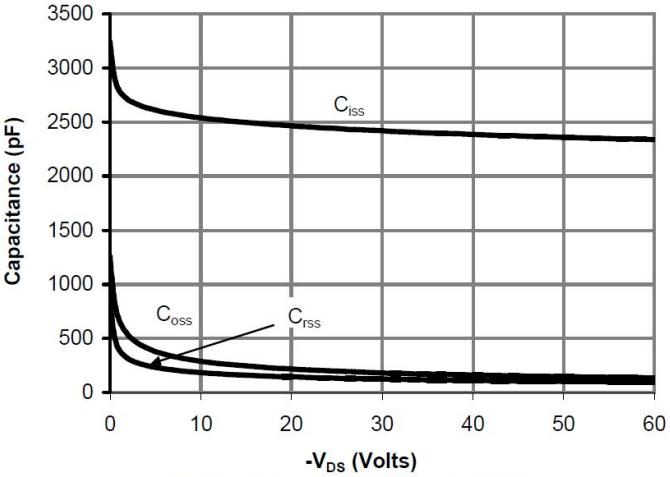



Figure 8: Capacitance Characteristics

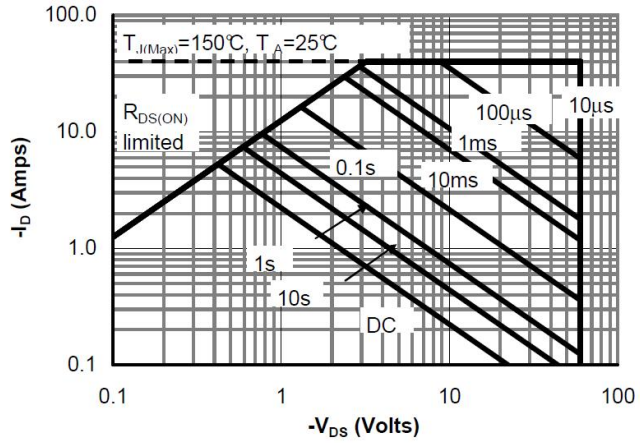



Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

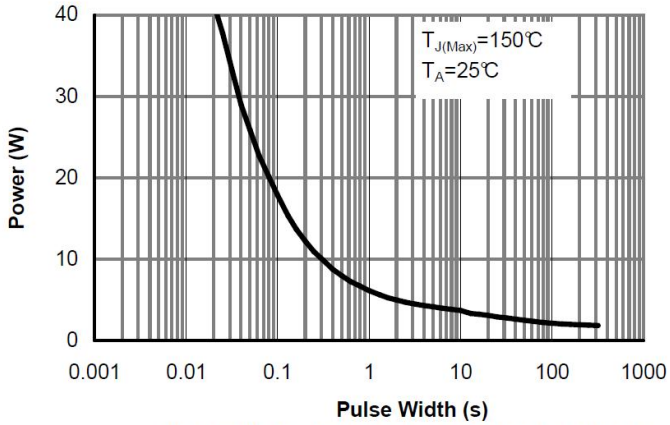



Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

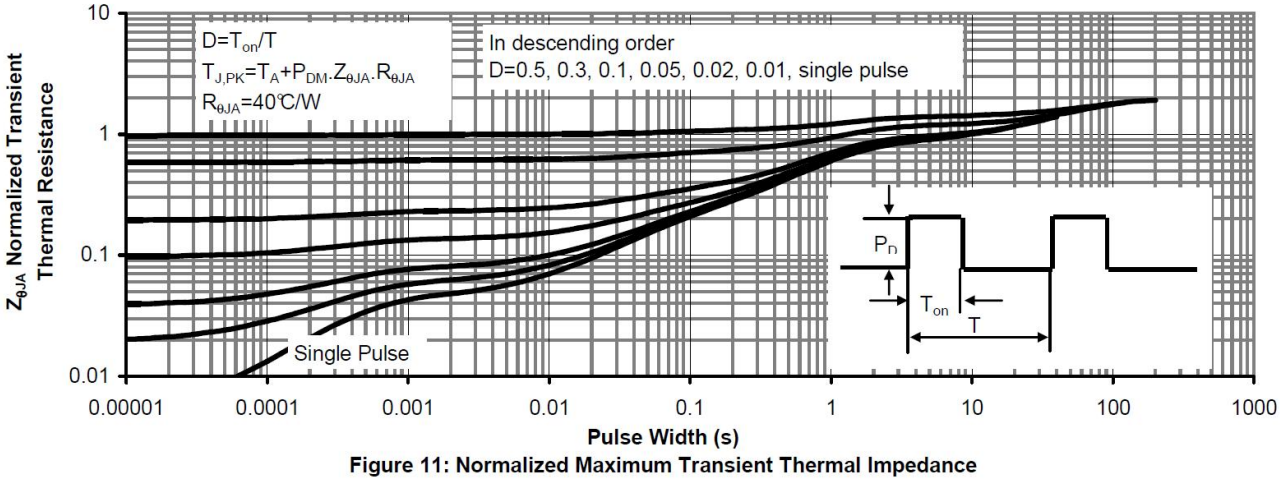
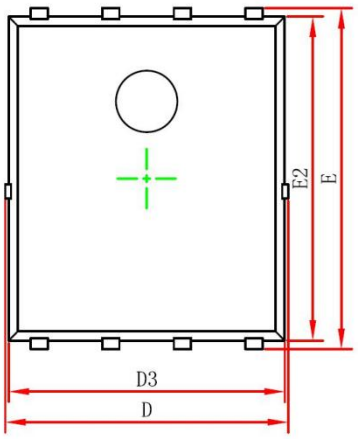
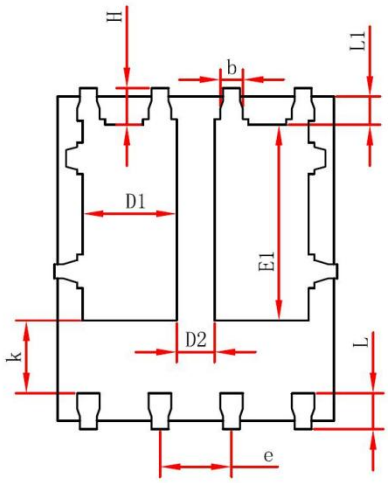



Figure 11: Normalized Maximum Transient Thermal Impedance

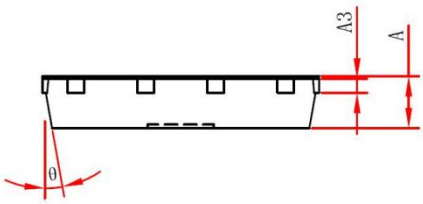
## PDFN5X6-8L Package Information




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° |

| 制 修 订 记 录 | | | | | |
|---|---|---|---|---|---|
| 文件版本 | 制修日期 | 修订页次 | 修订人 | 变更内容 | |
| Ver-1.0 | 2023/3/1 | | 覃源 | 新建规格书 | |
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