

- ★ Super Low Gate Charge
- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

## Product Summary



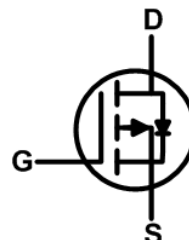
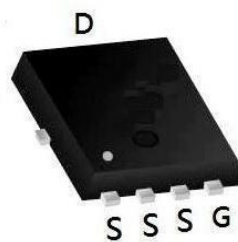
| BVDSS | RDSON | ID   |
|-------|-------|------|
| -100V | 72mΩ  | -18A |

## Description

The XR18P10D is the high cell density trenched P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The XR18P10D meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

## PDFN3333-8L Pin Configuration



## Absolute Maximum Ratings:

| Symbol         | Parameter                                        |                                     | Value           | Units              |
|----------------|--------------------------------------------------|-------------------------------------|-----------------|--------------------|
| $V_{DSS}$      | Drain-to-Source Voltage                          |                                     | -100            | V                  |
| $I_D$          | Continuous Drain Current                         | $T_C = 25\text{ }^{\circ}\text{C}$  | -18             | A                  |
|                | Continuous Drain Current                         | $T_C = 100\text{ }^{\circ}\text{C}$ | -13             | A                  |
| $I_{DM}^{a1}$  | Pulsed Drain Current                             |                                     | -80             | A                  |
| $E_{AS}^{a2}$  | Single pulse avalanche energy                    |                                     | 200             | mJ                 |
| $V_{GS}$       | Gate-to-Source Voltage                           |                                     | $\pm 20$        | V                  |
| $P_D$          | Power Dissipation                                |                                     | 80              | W                  |
| $T_J, T_{stg}$ | Operating Junction and Storage Temperature Range |                                     | 150, -55 to 150 | $^{\circ}\text{C}$ |
| $T_L$          | Maximum Temperature for Soldering                |                                     | 260             | $^{\circ}\text{C}$ |

## Thermal Characteristics:

| Symbol          | Parameter                               | Value | Units                |
|-----------------|-----------------------------------------|-------|----------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case    | 1.56  | $^{\circ}\text{C/W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 91    | $^{\circ}\text{C/W}$ |

**Electrical Characteristics** (TA= 25°C unless otherwise specified) :

| Static Characteristics |                                   |                                                           |       |      |      |       |
|------------------------|-----------------------------------|-----------------------------------------------------------|-------|------|------|-------|
| Symbol                 | Parameter                         | Test Conditions                                           | Value |      |      | Units |
|                        |                                   |                                                           | Min.  | Typ. | Max. |       |
| V <sub>DSS</sub>       | Drain to Source Breakdown Voltage | V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA               | -100  | --   | --   | V     |
| I <sub>DSS</sub>       | Drain to Source Leakage Current   | V <sub>DS</sub> =-100V, V <sub>GS</sub> =0V               | --    | --   | 1    | μA    |
| I <sub>GSS(F)</sub>    | Gate to Source Forward Leakage    | V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V                | --    | --   | 100  | nA    |
| I <sub>GSS(R)</sub>    | Gate to Source Reverse Leakage    | V <sub>GS</sub> =+20V, V <sub>DS</sub> =0V                | --    | --   | -100 | nA    |
| V <sub>GS(TH)</sub>    | Gate Threshold Voltage            | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA | -1.5  | -2.0 | -2.5 | V     |
| R <sub>DS(ON)1</sub>   | Drain-to-Source Resistance        | On- V <sub>GS</sub> =-10V, I <sub>D</sub> =-10A           | --    | 72   | 89   | mΩ    |
| R <sub>DS(ON)2</sub>   | Drain-to-Source Resistance        | On- V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-5A           | --    | 87   | 105  | mΩ    |

| Dynamic Characteristics |                              |                                                              |       |      |      |       |
|-------------------------|------------------------------|--------------------------------------------------------------|-------|------|------|-------|
| Symbol                  | Parameter                    | Test Conditions                                              | Value |      |      | Units |
|                         |                              |                                                              | Min.  | Typ. | Max. |       |
| C <sub>iss</sub>        | Input Capacitance            | V <sub>GS</sub> = 0V<br>V <sub>DS</sub> = -50V<br>f = 1.0MHz | --    | 1305 | --   | pF    |
| C <sub>oss</sub>        | Output Capacitance           |                                                              | --    | 97.5 | --   |       |
| C <sub>rss</sub>        | Reverse Transfer Capacitance |                                                              | --    | 9.1  | --   |       |
| R <sub>g</sub>          | Gate resistance              | V <sub>GS</sub> = 0V, V <sub>DS</sub> Open                   | --    | 75   | --   | Ω     |

| Resistive Switching Characteristics |                     |                                                                                                  |       |       |      |       |
|-------------------------------------|---------------------|--------------------------------------------------------------------------------------------------|-------|-------|------|-------|
| Symbol                              | Parameter           | Test Conditions                                                                                  | Value |       |      | Units |
|                                     |                     |                                                                                                  | Min.  | Typ.  | Max. |       |
| t <sub>d(ON)</sub>                  | Turn-on Delay Time  | I <sub>D</sub> = -10A<br>V <sub>DS</sub> = -50V<br>V <sub>GS</sub> = -10V<br>R <sub>G</sub> = 5Ω | --    | 8.8   | --   | ns    |
| t <sub>r</sub>                      | Rise Time           |                                                                                                  | --    | 16    | --   |       |
| t <sub>d(OFF)</sub>                 | Turn-Off Delay Time |                                                                                                  | --    | 60    | --   |       |
| t <sub>f</sub>                      | Fall Time           |                                                                                                  | --    | 41    | --   |       |
| Q <sub>g</sub>                      | Total Gate Charge   | V <sub>GS</sub> = -10V<br>V <sub>DS</sub> = -50V<br>I <sub>D</sub> = -10A                        | --    | 22.16 | --   | nC    |
| Q <sub>gs</sub>                     | Gate Source Charge  |                                                                                                  | --    | 4.59  | --   |       |
| Q <sub>gd</sub>                     | Gate Drain Charge   |                                                                                                  | --    | 4.53  | --   |       |

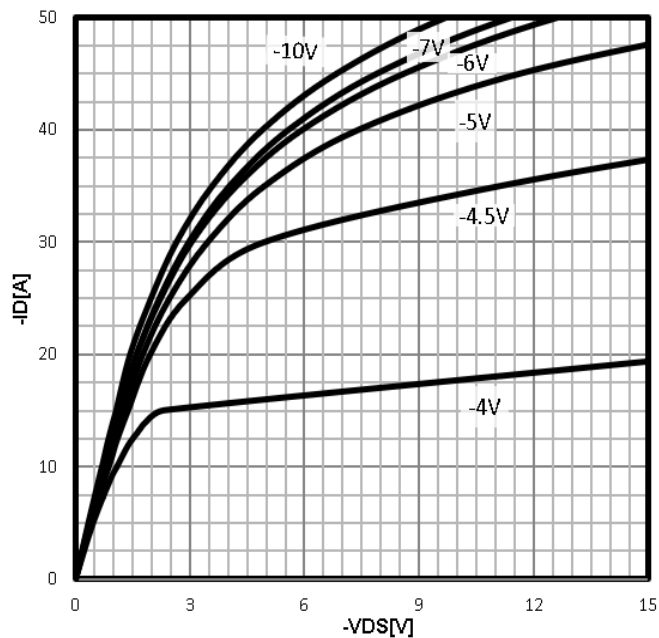
| Source-Drain Diode Characteristics |                         |                                                              |       |      |      |       |
|------------------------------------|-------------------------|--------------------------------------------------------------|-------|------|------|-------|
| Symbol                             | Parameter               | Test Conditions                                              | Value |      |      | Units |
|                                    |                         |                                                              | Min.  | Typ. | Max. |       |
| V <sub>SD</sub>                    | Diode Forward Voltage   | I <sub>S</sub> =-10A, V <sub>GS</sub> =0V                    | --    | --   | -1.2 | V     |
| t <sub>rr</sub>                    | Reverse Recovery time   | I <sub>S</sub> =-10A, V <sub>DD</sub> =-50V<br>dI/dt=100A/μs | --    | 30   | --   | ns    |
| Q <sub>rr</sub>                    | Reverse Recovery Charge |                                                              | --    | 61   | --   | nC    |

a1 : Repetitive rating; pulse width limited by maximum junction temperature

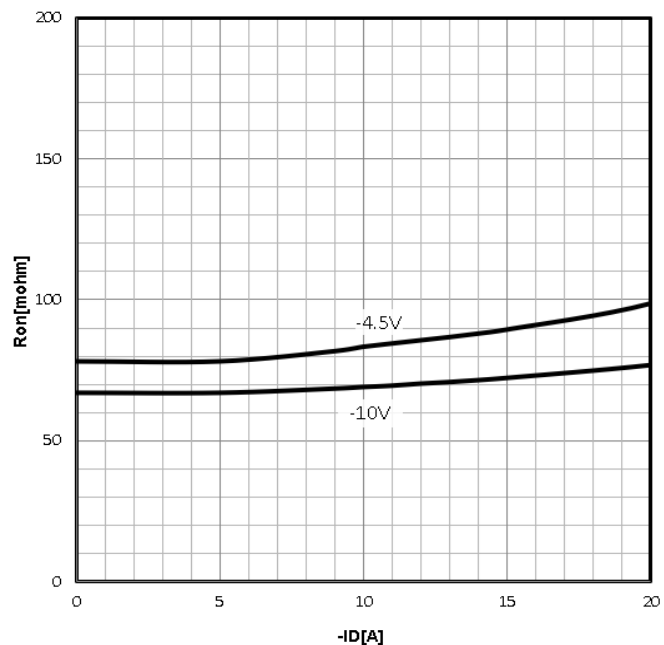
a2 : L=5mH, R<sub>g</sub>=25Ω, Starting T<sub>J</sub>=25 °C

### Characteristics Curve:

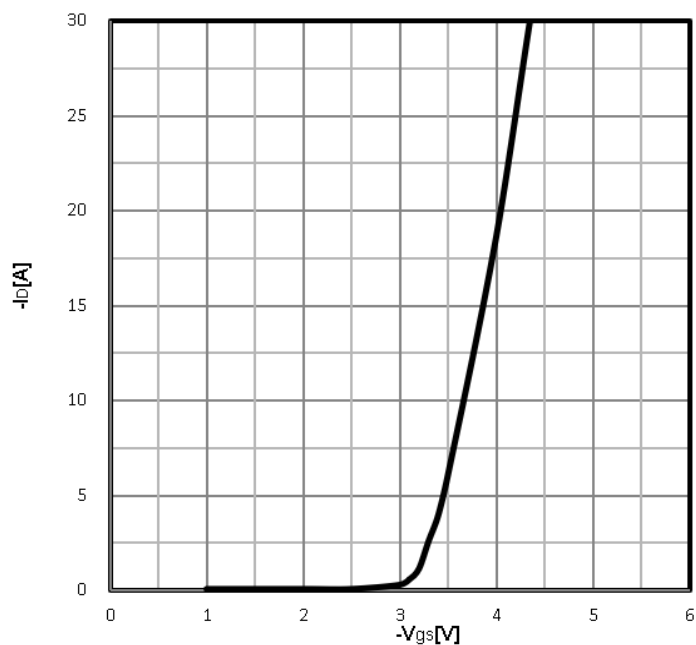
**Typ. output characteristics**  
 $-I_D = f(-V_{DS})$



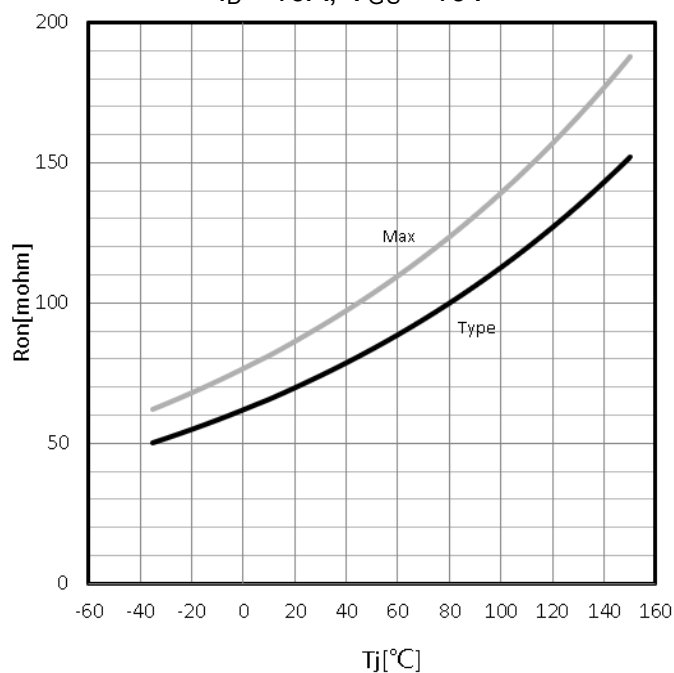
**Typ. drain-source on resistance**  
 $R_{DS(on)} = f(-I_D)$



**Typ. transfer characteristics**  
 $-I_D = f(-V_{GS})$

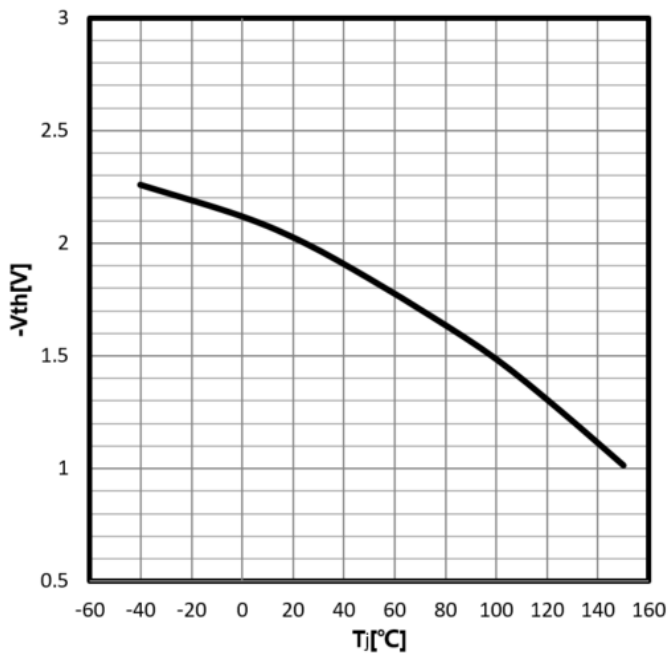


**Drain-source on-state resistance**  
 $R_{DS(on)} = f(T_j)$   
 $I_D = -10A$ ;  $V_{GS} = -10V$

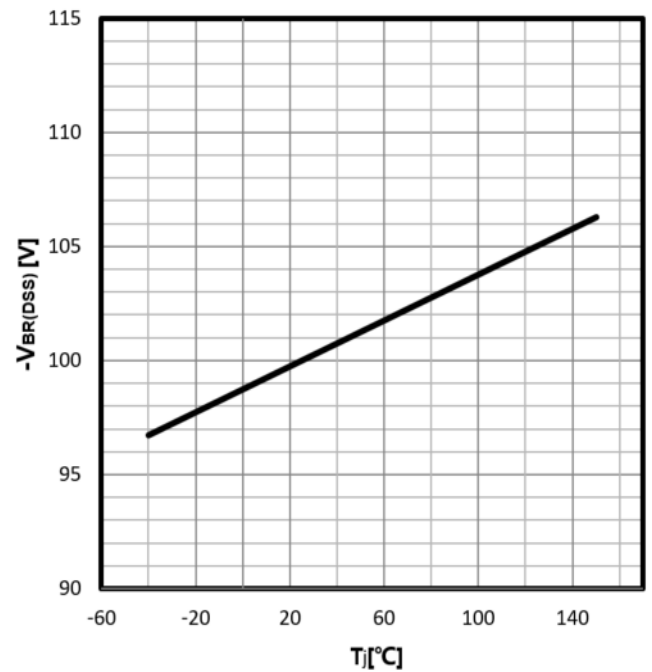


### P-Ch 100V Fast Switching MOSFETs

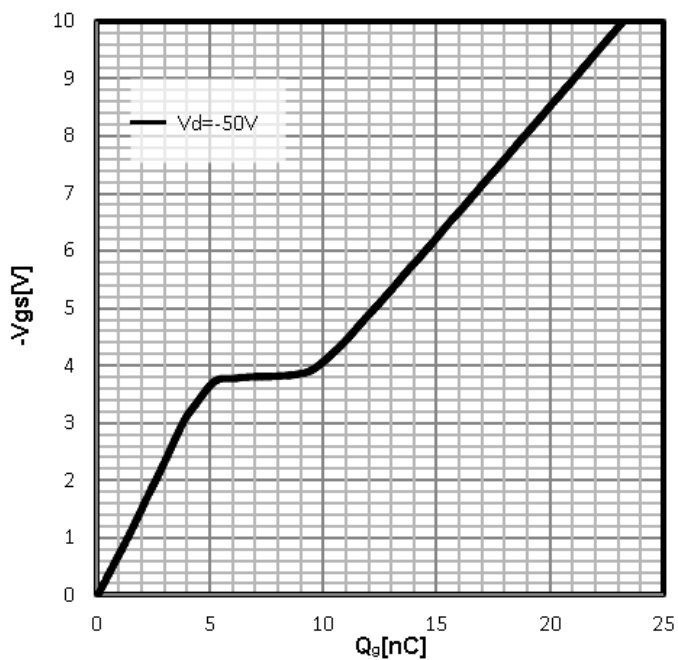
**Gate Threshold Voltage**  
 $-V_{TH}=f(T_j)$ ;  
 $I_D=-250\mu A$



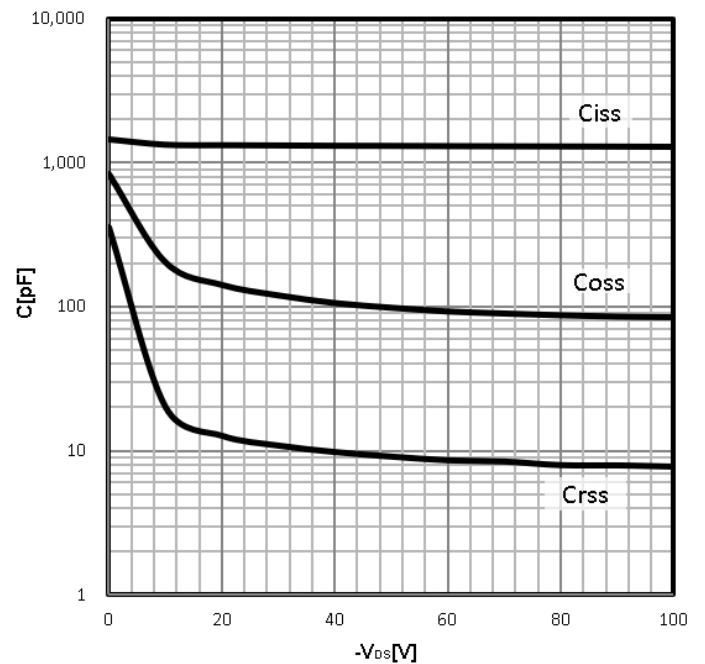
**Drain-source breakdown voltage**  
 $-V_{BR(DSS)}=f(T_j)$ ;  $I_D=-250\mu A$



**Typ. gate charge**  
 $-V_{GS}=f(Q_g)$ ;  
 $I_D=-10A$

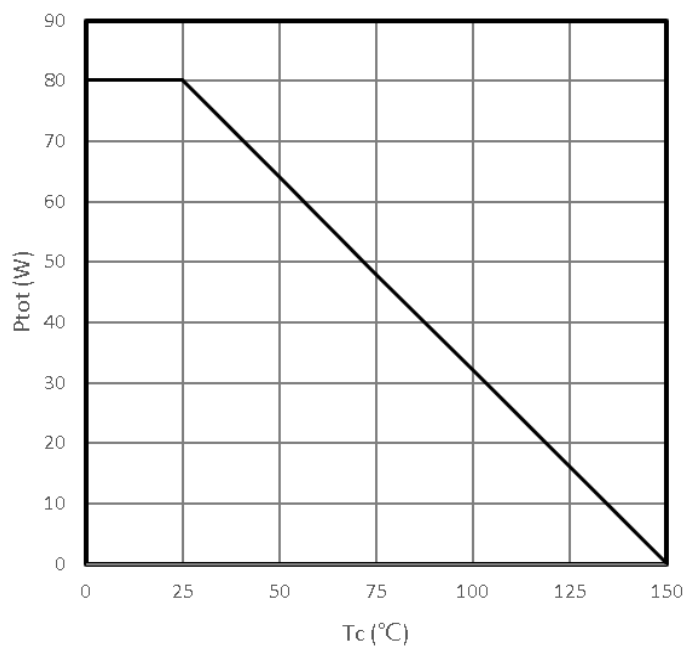


**Typ. capacitances**  
 $C=f(-V_{DS})$ ;  $V_{GS}=0V$ ;  $f=1MHz$



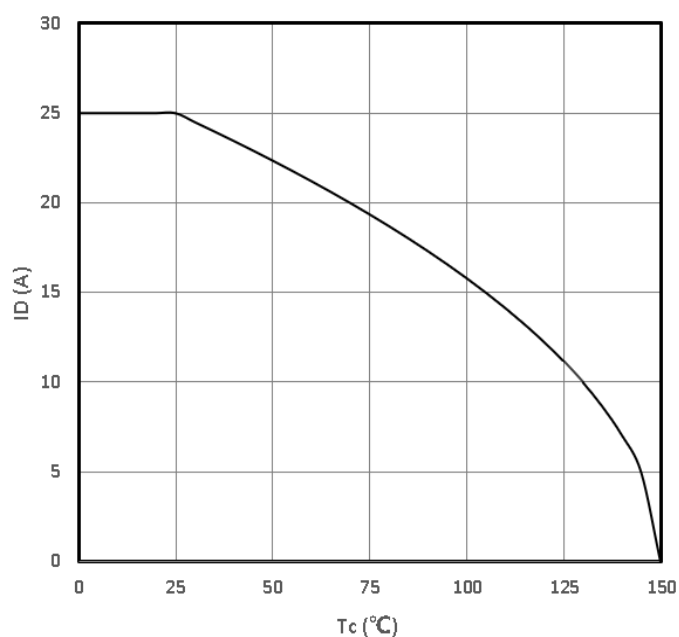
### Power Dissipation

$$P_{tot}=f(T_C)$$



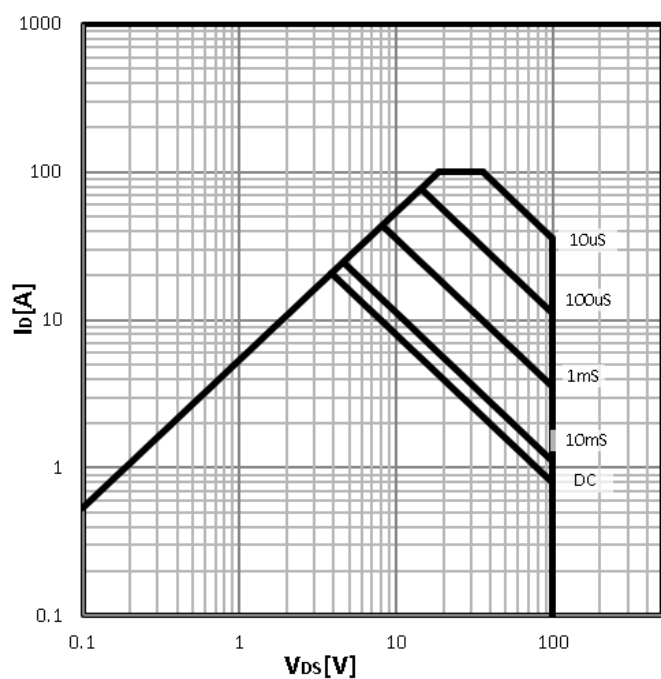
### Maximum Drain Current

$$-I_D=f(T_C)$$



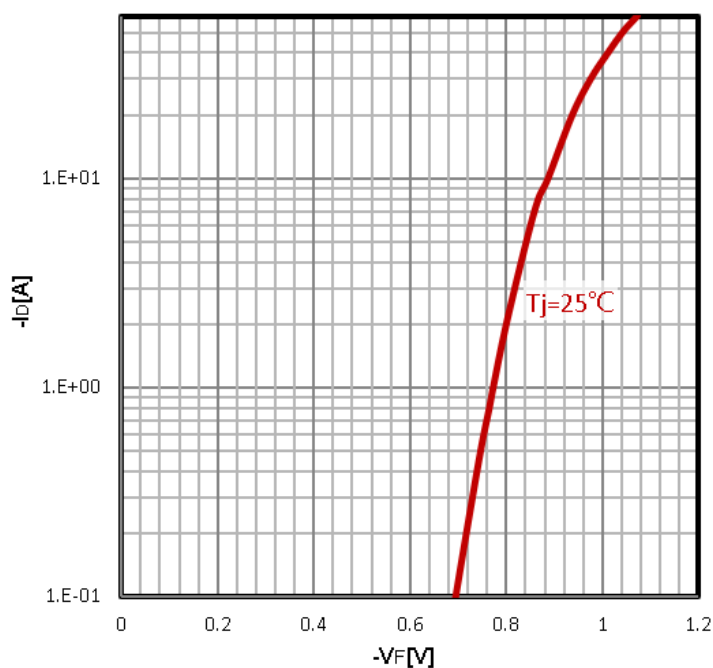
### Safe operating area

$$-I_D=f(-V_{DS})$$



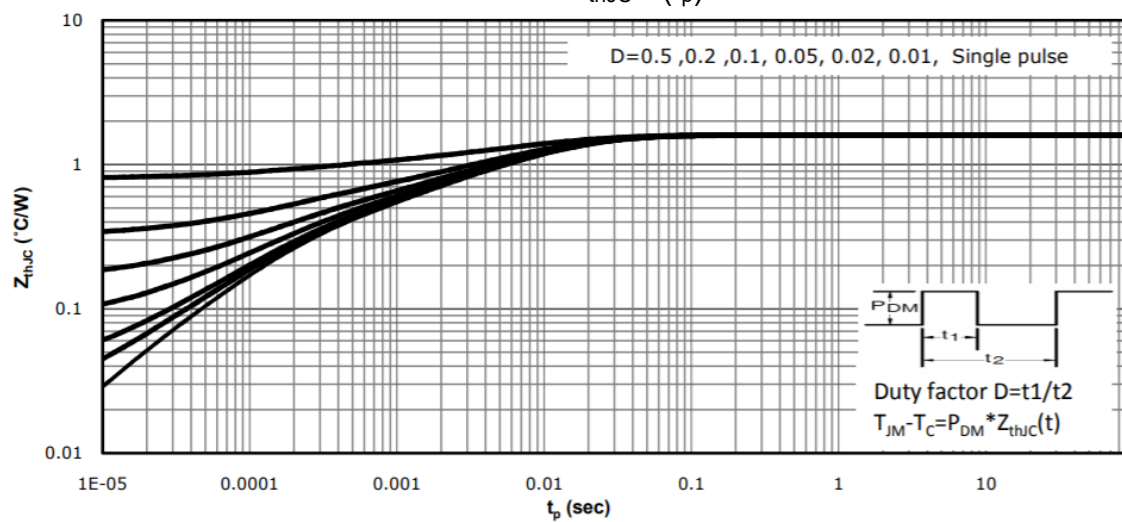
### Body Diode Forward Voltage Variation

$$-I_F=f(-V_{DS})$$

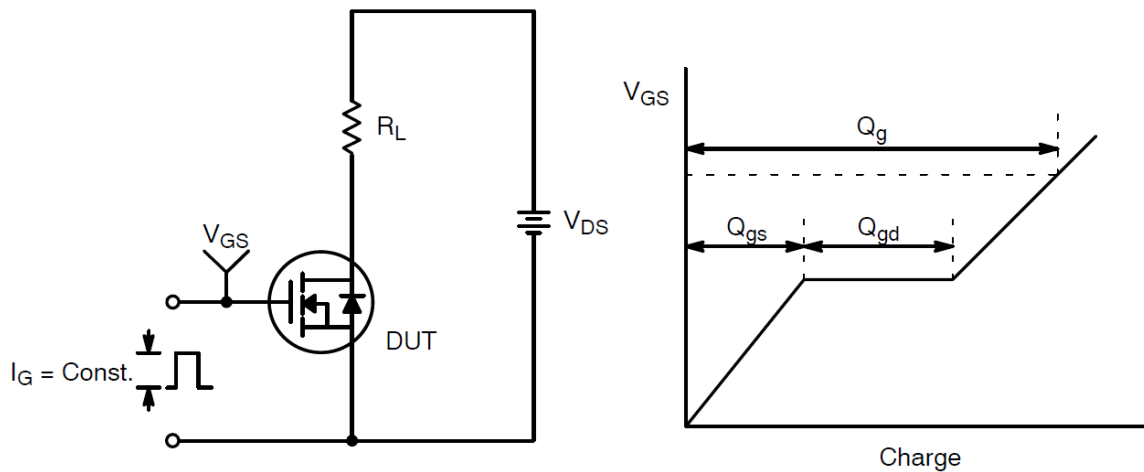


### Max. transient thermal impedance

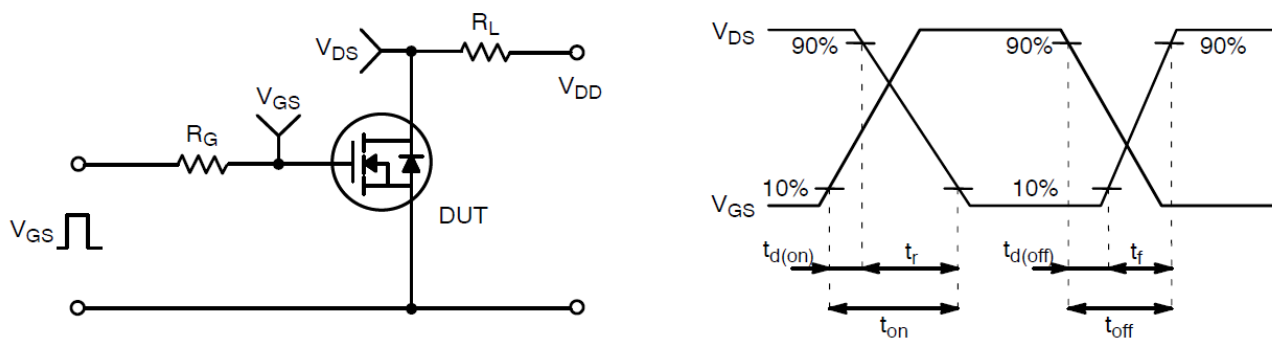
$$Z_{thJC}=f(t_p)$$



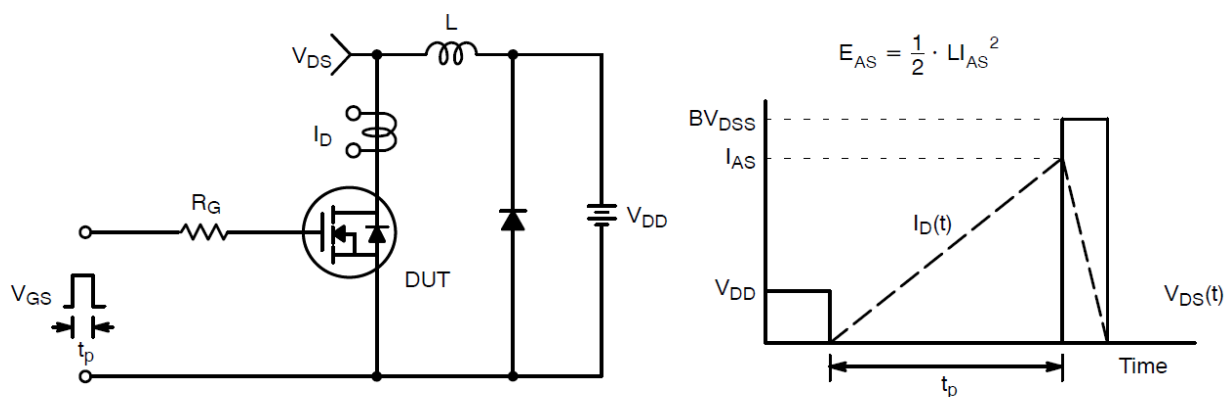
### Test Circuit and Waveform:



**Gate Charge Test Circuit & Waveform**

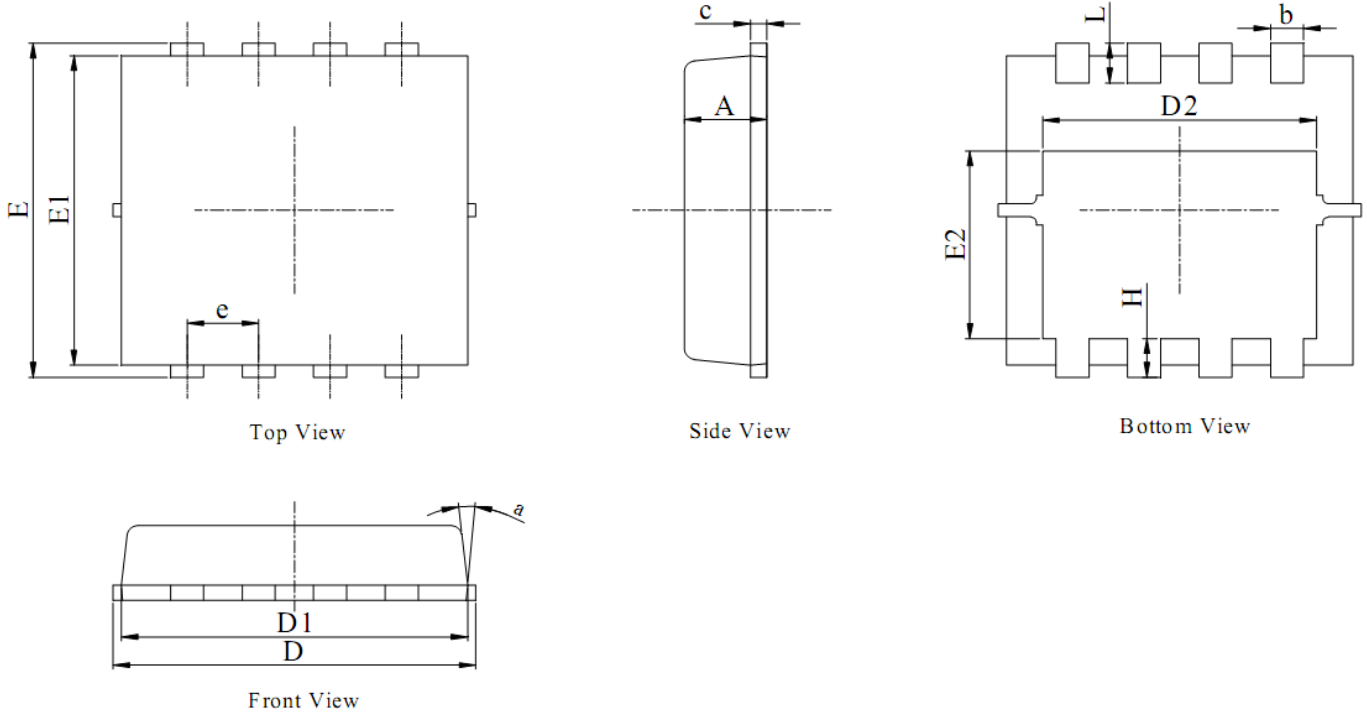


**Resistive Switching Test Circuit & Waveforms**



**Unclamped Inductive Switching Test Circuit & Waveforms**

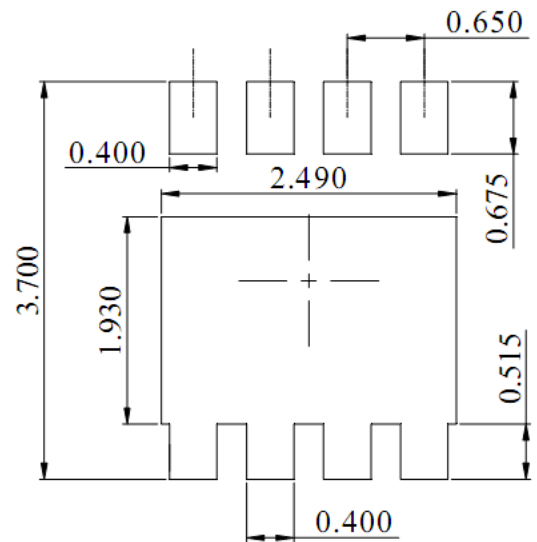
### Package Mechanical Data-PDFN3333-8L-Single



#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M,1994.
2. ALL DIMENSIONS IN MILLIMETER (ANGLE IN DEGREE).
3. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

| DIM. | MILLIMETER |      |      |
|------|------------|------|------|
|      | MIN.       | NOM. | MAX. |
| A    | 0.70       | 0.75 | 0.80 |
| b    | 0.25       | 0.30 | 0.35 |
| c    | 0.10       | 0.20 | 0.25 |
| D    | 3.00       | 3.15 | 3.25 |
| D1   | 2.95       | 3.05 | 3.15 |
| D2   | 2.39       | 2.49 | 2.59 |
| E    | 3.20       | 3.30 | 3.40 |
| E1   | 2.95       | 3.05 | 3.15 |
| E2   | 1.70       | 1.80 | 1.90 |
| e    | 0.65 BSC   |      |      |
| H    | 0.30       | 0.40 | 0.50 |
| L    | 0.25       | 0.40 | 0.50 |
| a    | ---        | ---  | 15°  |



DIMENSIONS:MILLIMETERS