

# PECJ210P02A

## Description

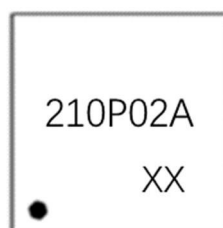
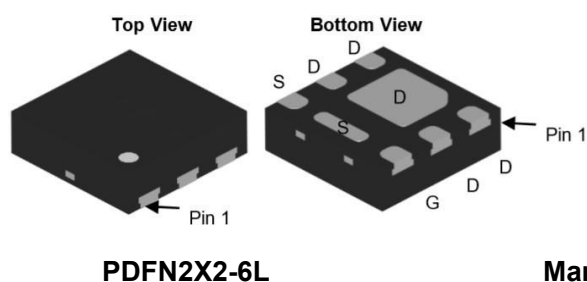
### PECJ P-channel Enhancement Mode Power MOSFET

#### Features

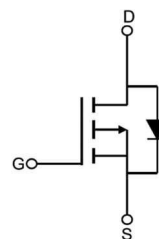
- -20V, -12A  
 $R_{DS(ON)} < 22m\Omega$  @  $V_{GS} = -4.5V$   
 $R_{DS(ON)} < 30m\Omega$  @  $V_{GS} = -2.5V$
- Advanced Trench Technology
- Provide Excellent  $R_{DS(ON)}$  and Low Gate Charge
- Lead free product is acquired

#### Application

- Load Switch
- PWM Application
- Power management



Marking and pin Assignment



Schematic Diagram

## Package Marking and Ordering Information

| Device Marking | Device      | OUTLINE | Device Package | Reel Size | Reel (PCS) | Per Carton (PCS) |
|----------------|-------------|---------|----------------|-----------|------------|------------------|
| 210P02A        | PECJ210P02A | TAPING  | PDFN2X2-6L     | 7inch     | 3000       | 180000           |

## Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ unless otherwise specified)

| Symbol          | Parameter                               |                           | Max.        | Units                     |
|-----------------|-----------------------------------------|---------------------------|-------------|---------------------------|
| $V_{DSS}$       | Drain-Source Voltage                    |                           | -20         | V                         |
| $V_{GSS}$       | Gate-Source Voltage                     |                           | $\pm 12$    | V                         |
| $I_D$           | Continuous Drain Current                | $T_C = 25^\circ\text{C}$  | -12         | A                         |
|                 |                                         | $T_C = 100^\circ\text{C}$ | -8          | A                         |
| $I_{DM}$        | Pulsed Drain Current <sup>note1</sup>   |                           | -48         | A                         |
| $P_D$           | Power Dissipation                       | $T_C = 25^\circ\text{C}$  | 4.5         | W                         |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case    |                           | 27.8        | $^\circ\text{C}/\text{W}$ |
| $T_J, T_{STG}$  | Operating and Storage Temperature Range |                           | -55 to +150 | $^\circ\text{C}$          |

## Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise specified)

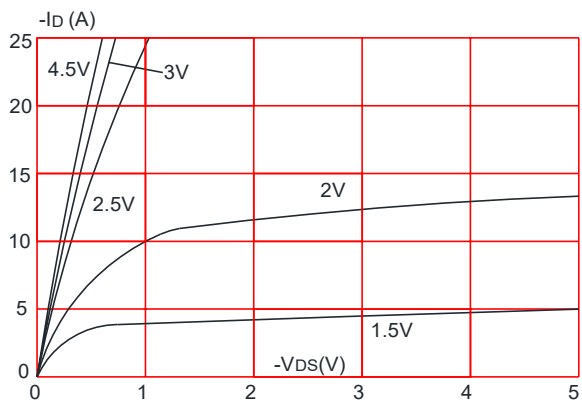
| Symbol                                                 | Parameter                                                | Test Condition                                                                                       | Min. | Typ. | Max. | Units |
|--------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------|------|------|------|-------|
| Off Characteristic                                     |                                                          |                                                                                                      |      |      |      |       |
| V <sub>(BR)DSS</sub>                                   | Drain-Source Breakdown Voltage                           | V <sub>GS</sub> =0V, I <sub>D</sub> = -250μA                                                         | -20  | -    | -    | V     |
| I <sub>DSS</sub>                                       | Zero Gate Voltage Drain Current                          | V <sub>DS</sub> = -20V, V <sub>GS</sub> =0V,                                                         | -    | -    | -1   | μA    |
| I <sub>GSS</sub>                                       | Gate to Body Leakage Current                             | V <sub>DS</sub> =0V, V <sub>GS</sub> = ±12V                                                          | -    | -    | ±100 | nA    |
| On Characteristics                                     |                                                          |                                                                                                      |      |      |      |       |
| V <sub>GS(th)</sub>                                    | Gate Threshold Voltage                                   | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> = -250μA                                           | -0.4 | -0.7 | -1.0 | V     |
| R <sub>DS(on)</sub>                                    | Static Drain-Source on-Resistance<br>note2               | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -10A                                                       | -    | 17   | 22   | mΩ    |
|                                                        |                                                          | V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -5A                                                        | -    | 22   | 30   |       |
| Dynamic Characteristics                                |                                                          |                                                                                                      |      |      |      |       |
| C <sub>iss</sub>                                       | Input Capacitance                                        | V <sub>DS</sub> = -10V, V <sub>GS</sub> =0V,<br>f=1.0MHz                                             | -    | 2000 | -    | pF    |
| C <sub>oss</sub>                                       | Output Capacitance                                       |                                                                                                      | -    | 242  | -    | pF    |
| C <sub>rss</sub>                                       | Reverse Transfer Capacitance                             |                                                                                                      | -    | 231  | -    | pF    |
| Q <sub>g</sub>                                         | Total Gate Charge                                        | V <sub>DS</sub> = -10V, I <sub>D</sub> = -6A,<br>V <sub>GS</sub> = -4.5V                             | -    | 15.3 | -    | nC    |
| Q <sub>gs</sub>                                        | Gate-Source Charge                                       |                                                                                                      | -    | 2.2  | -    | nC    |
| Q <sub>gd</sub>                                        | Gate-Drain(“Miller”) Charge                              |                                                                                                      | -    | 4.4  | -    | nC    |
| Switching Characteristics                              |                                                          |                                                                                                      |      |      |      |       |
| t <sub>d(on)</sub>                                     | Turn-on Delay Time                                       | V <sub>DD</sub> = -10V, I <sub>D</sub> = -12A,<br>V <sub>GS</sub> = -4.5V,<br>R <sub>GEN</sub> =2.5Ω | -    | 10   | -    | ns    |
| t <sub>r</sub>                                         | Turn-on Rise Time                                        |                                                                                                      | -    | 31   | -    | ns    |
| t <sub>d(off)</sub>                                    | Turn-off Delay Time                                      |                                                                                                      | -    | 28   | -    | ns    |
| t <sub>f</sub>                                         | Turn-off Fall Time                                       |                                                                                                      | -    | 8    | -    | ns    |
| Drain-Source Diode Characteristics and Maximum Ratings |                                                          |                                                                                                      |      |      |      |       |
| I <sub>S</sub>                                         | Maximum Continuous Drain to Source Diode Forward Current |                                                                                                      | -    | -    | -12  | A     |
| I <sub>SM</sub>                                        | Maximum Pulsed Drain to Source Diode Forward Current     |                                                                                                      | -    | -    | -48  | A     |
| V <sub>SD</sub>                                        | Drain to Source Diode Forward Voltage                    | V <sub>GS</sub> =0V, I <sub>S</sub> = -12A                                                           | -    | -0.8 | -1.2 | V     |

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

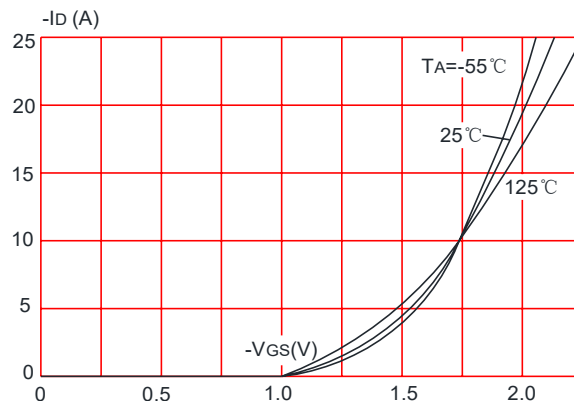
2. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

## Typical Performance Characteristics

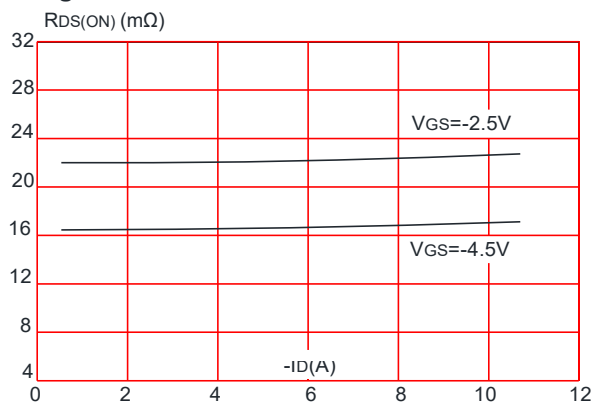
**Figure 1: Output Characteristics**



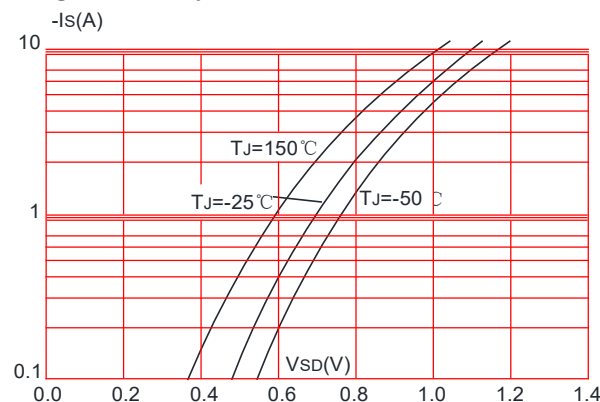
**Figure 2: Typical Transfer Characteristics**



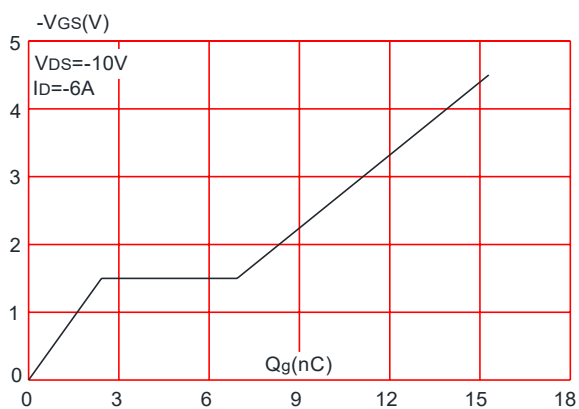
**Figure 3: On-resistance vs. Drain Current**



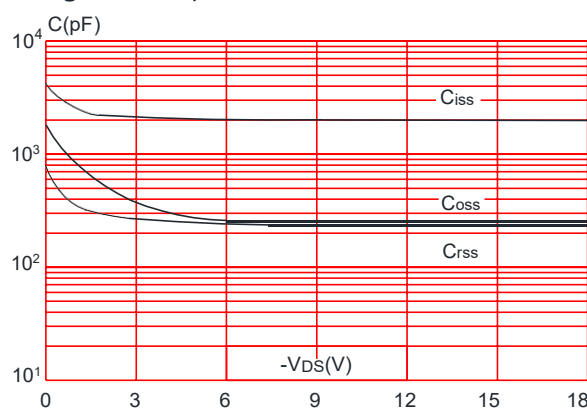
**Figure 4: Body Diode Characteristics**



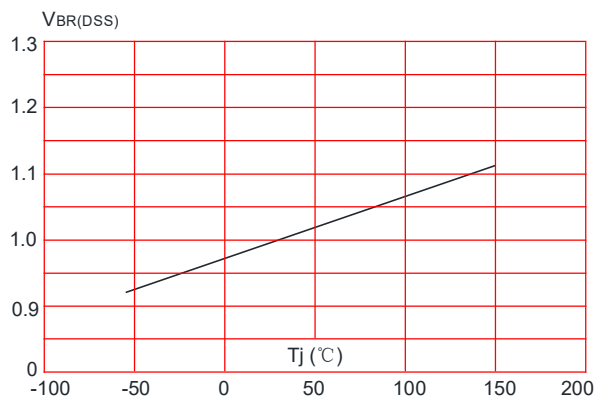
**Figure 5: Gate Charge Characteristics**



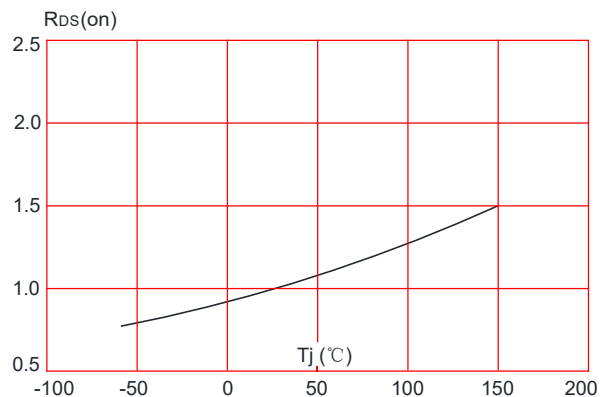
**Figure 6: Capacitance Characteristics**



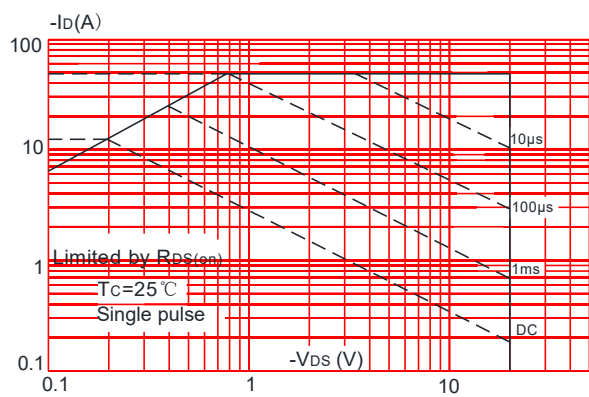
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



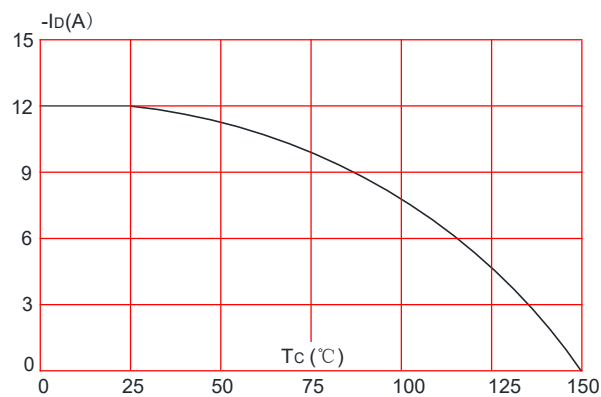
**Figure 8:** Normalized on Resistance vs. Junction Temperature



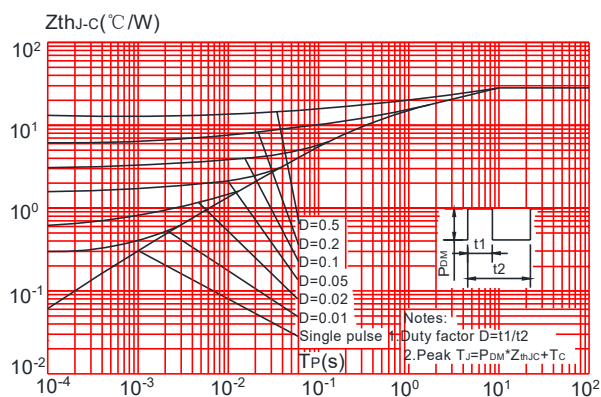
**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature

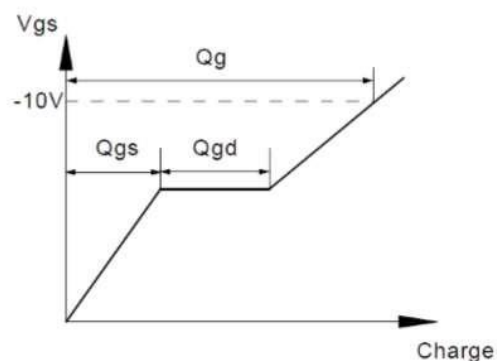
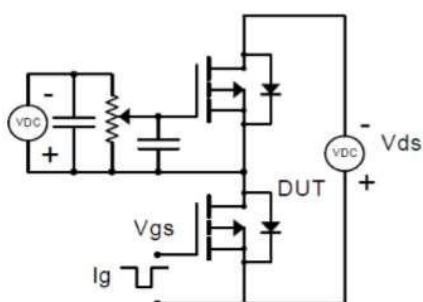


**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case

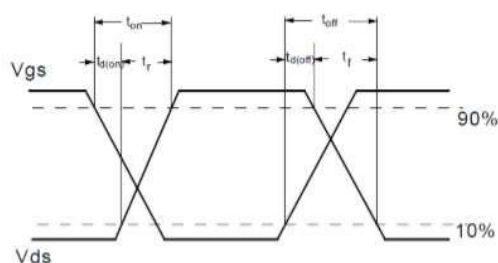
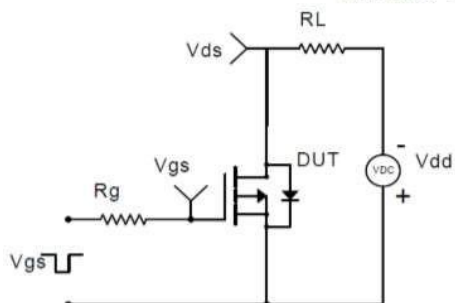


## Test Circuit

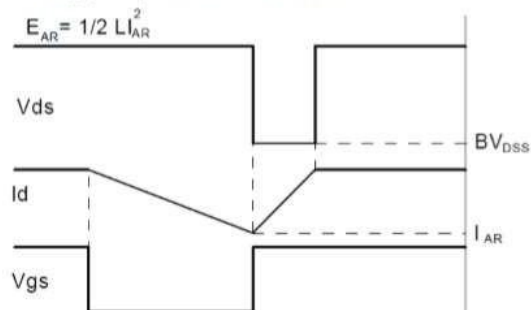
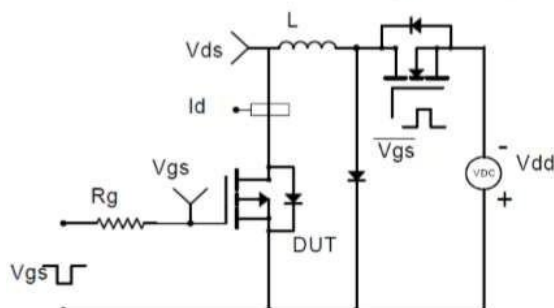
Gate Charge Test Circuit & Waveform



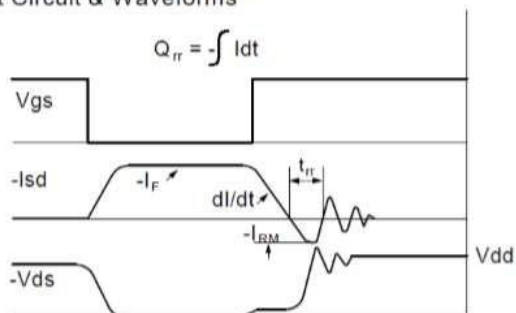
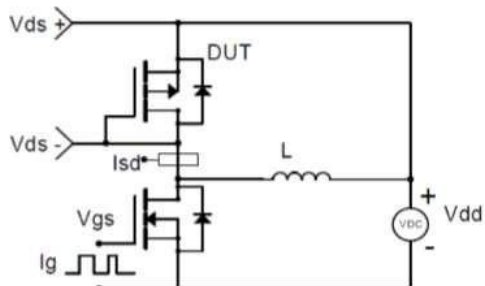
Resistive Switching Test Circuit & Waveforms



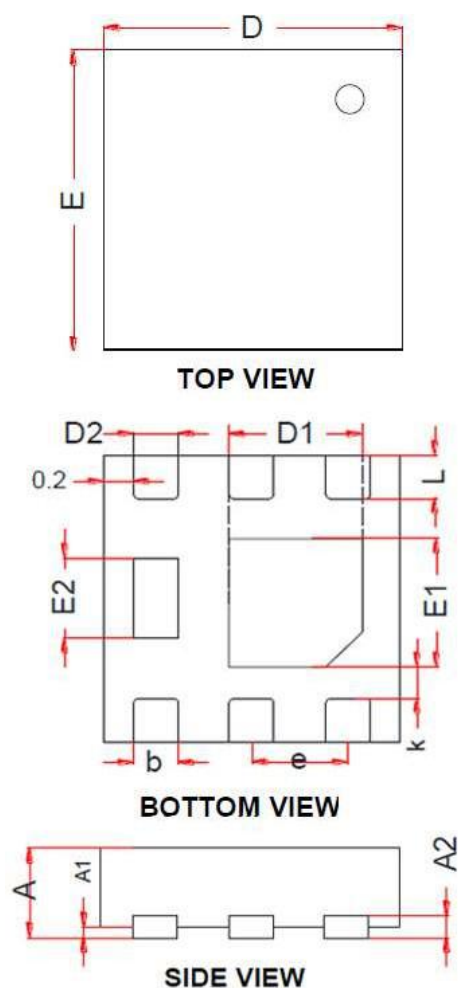
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



## Package Mechanical Data- PDFN2X2-6L



| Symbol | Dimensions in millimeters |      |      |
|--------|---------------------------|------|------|
|        | Min.                      | Typ. | Max. |
| A      | 0.70                      | 0.75 | 0.85 |
| A1     | 0.00                      | 0.02 | 0.05 |
| A2     | 0.20Ref.                  |      |      |
| b      | 0.25                      | 0.30 | 0.35 |
| D      | 1.95                      | 2.00 | 2.05 |
| D1     | 0.85                      | 0.90 | 0.95 |
| D2     | 0.25                      | 0.30 | 0.35 |
| E      | 1.95                      | 2.00 | 2.05 |
| E1     | 0.75                      | 0.80 | 0.85 |
| E2     | 0.56Ref.                  |      |      |
| e      | 0.65BSC.                  |      |      |
| L      | 0.30                      | 0.35 | 0.40 |
| K      | 0.20                      | -    | -    |