

## N-Ch 20V Fast Switching MOSFETs

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

## Product Summary

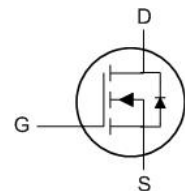
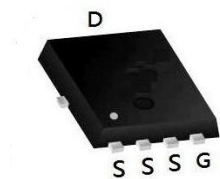


| BVDSS | RDSON  | ID  |
|-------|--------|-----|
| 20V   | 3.5 mΩ | 80A |

## Description

The XR80N02Fs the high cell density trenched N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications. The XR80N02F meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

## PDFN5060-8L Pin Configuration



## Absolute Maximum Ratings

| Symbol                      | Parameter                                  | Rating     | Units            |
|-----------------------------|--------------------------------------------|------------|------------------|
| $V_{DS}$                    | Drain-Source Voltage                       | 20         | V                |
| $V_{GS}$                    | Gate-Source Voltage                        | $\pm 12$   | V                |
| $I_D@T_C=25^\circ\text{C}$  | Continuous Drain Current, $V_{GS} @ 10V^1$ | 80         | A                |
| $I_D@T_C=100^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 35         | A                |
| $I_{DM}$                    | Pulsed Drain Current <sup>2</sup>          | 200        | A                |
| EAS                         | Single Pulse Avalanche Energy <sup>3</sup> | 58         | mJ               |
| $I_{AS}$                    | Avalanche Current                          | 41         | A                |
| $P_D@T_C=25^\circ\text{C}$  | Total Power Dissipation <sup>4</sup>       | 58         | W                |
| $T_{STG}$                   | Storage Temperature Range                  | -55 to 150 | $^\circ\text{C}$ |
| $T_J$                       | Operating Junction Temperature Range       | -55 to 150 | $^\circ\text{C}$ |

## Thermal Data

| Symbol          | Parameter                                     | Typ. | Max. | Unit               |
|-----------------|-----------------------------------------------|------|------|--------------------|
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup> | ---  | 2.6  | $^\circ\text{C/W}$ |

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Electrical Characteristics ( $T_J=25^{\circ}\text{C}$  unless otherwise specified)

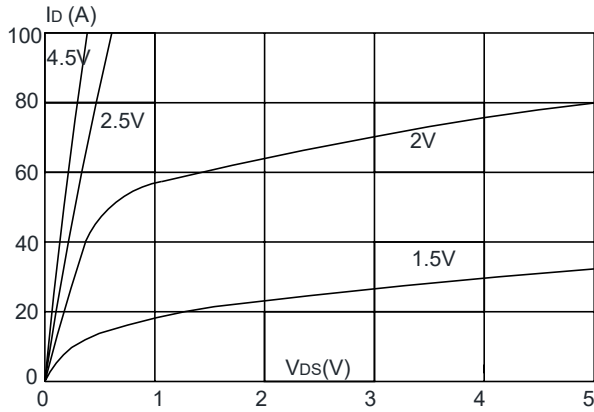
| Symbol                                                 | Parameter                                                 | Test Condition                                                                               | Min. | Typ. | Max. | Units |
|--------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------------------|------|------|------|-------|
| 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,                                                   | -    | -    | 1.0  | 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  | 1.1  | V     |
| R <sub>DS(on)</sub>                                    | Static Drain-Source on-Resistance<br><small>note3</small> | V <sub>GS</sub> =4.5V, I <sub>D</sub> =30A                                                   | -    | 3.5  | 5    | mΩ    |
|                                                        |                                                           | V <sub>GS</sub> =2.5V, I <sub>D</sub> =20A                                                   | -    | 6.5  | 9    |       |
| Dynamic Characteristics                                |                                                           |                                                                                              |      |      |      |       |
| C <sub>iss</sub>                                       | Input Capacitance                                         | V <sub>DS</sub> =10V, V <sub>GS</sub> =0V,<br>f = 1.0MHz                                     | -    | 2500 | -    | pF    |
| C <sub>oss</sub>                                       | Output Capacitance                                        |                                                                                              | -    | 407  | -    | pF    |
| C <sub>rss</sub>                                       | Reverse Transfer Capacitance                              |                                                                                              | -    | 386  | -    | pF    |
| Q <sub>g</sub>                                         | Total Gate Charge                                         | V <sub>DS</sub> =10V, I <sub>D</sub> =30A,<br>V <sub>GS</sub> =4.5V                          | -    | 32   | -    | nC    |
| Q <sub>gs</sub>                                        | Gate-Source Charge                                        |                                                                                              | -    | 3    | -    | nC    |
| Q <sub>gd</sub>                                        | Gate-Drain(“Miller”) Charge                               |                                                                                              | -    | 11   | -    | nC    |
| Switching Characteristics                              |                                                           |                                                                                              |      |      |      |       |
| t <sub>d(on)</sub>                                     | Turn-on Delay Time                                        | V <sub>DS</sub> =10V,<br>I <sub>D</sub> =30A, R <sub>GEN</sub> =3Ω,<br>V <sub>GS</sub> =4.5V | -    | 17   | -    | ns    |
| t <sub>r</sub>                                         | Turn-on Rise Time                                         |                                                                                              | -    | 49   | -    | ns    |
| t <sub>d(off)</sub>                                    | Turn-off Delay Time                                       |                                                                                              | -    | 74   | -    | ns    |
| t <sub>f</sub>                                         | Turn-off Fall Time                                        |                                                                                              | -    | 26   | -    | ns    |
| Drain-Source Diode Characteristics and Maximum Ratings |                                                           |                                                                                              |      |      |      |       |
| I <sub>S</sub>                                         | Maximum Continuous Drain to Source Diode Forward Current  |                                                                                              | -    | -    | 80   | A     |
| I <sub>SM</sub>                                        | Maximum Pulsed Drain to Source Diode Forward Current      |                                                                                              | -    | -    | 300  | A     |
| V <sub>SD</sub>                                        | Drain to Source Diode Forward Voltage                     | V <sub>GS</sub> = 0V, I <sub>S</sub> =30A                                                    | -    | -    | 1.2  | V     |

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

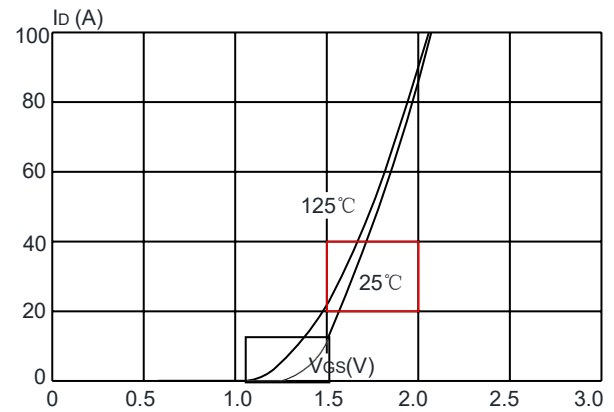
2. EAS condition:  $T_J=25^{\circ}\text{C}$ ,  $V_{DD}=10V$ ,  $V_G=4.5V$ ,  $L=0.5mH$ ,  $R_G=25\Omega$ ,  $I_{AS}=15A$ 3. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 0.5\%$

### Typical Performance Characteristics

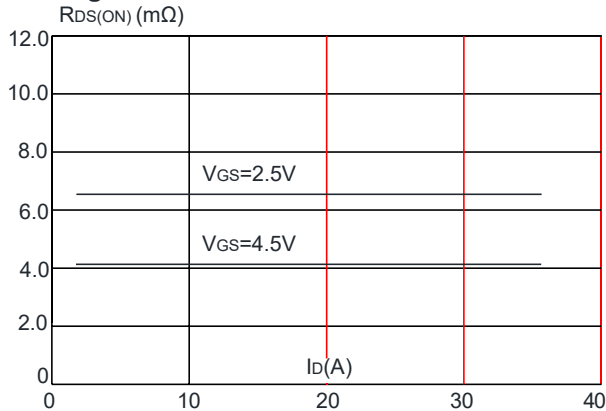
**Figure1: Output Characteristics**



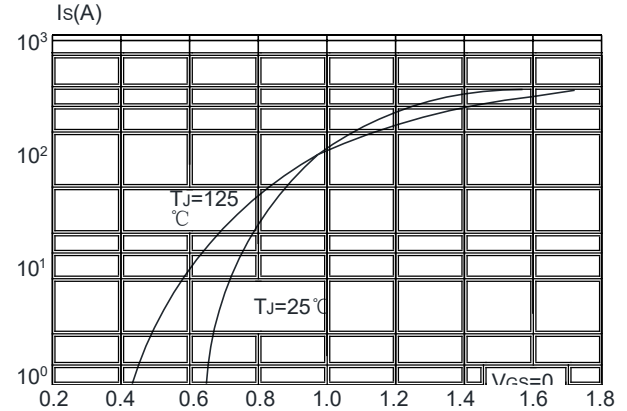
**Figure 2: Typical Transfer Characteristics**



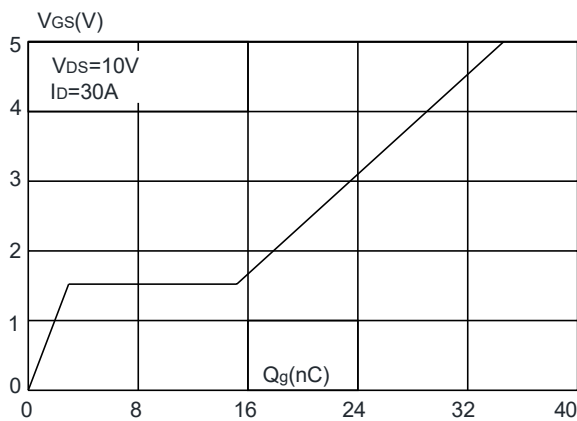
**Figure 3: On-resistance vs. Drain Current**



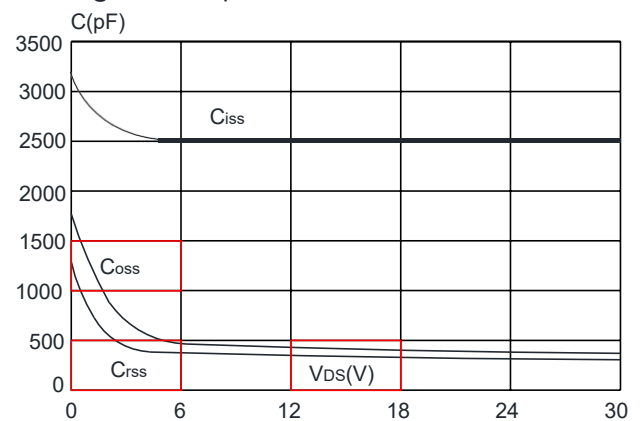
**Figure 4: Body Diode Characteristics**



**Figure 5: Gate Charge Characteristics**

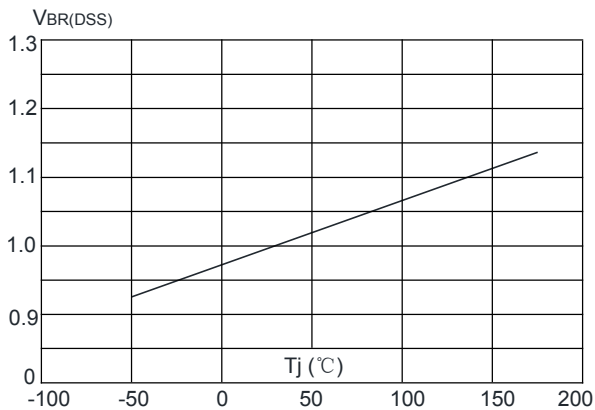


**Figure 6: Capacitance Characteristics**

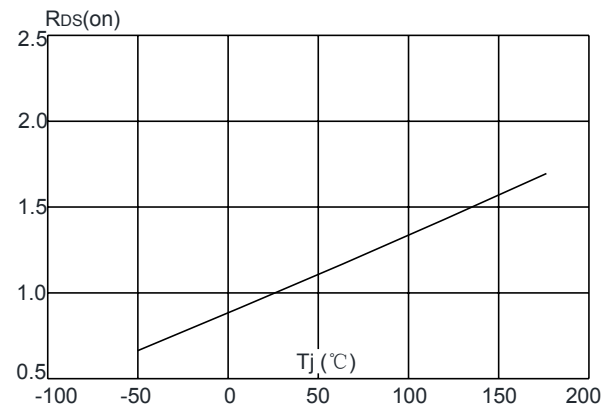


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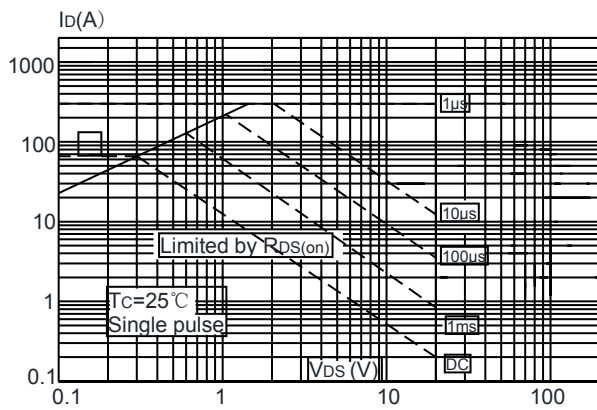
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



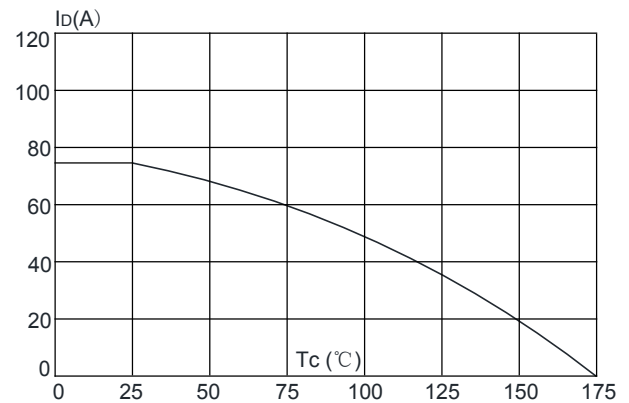
**Figure 8:** Normalized on Resistance vs. Junction Temperature



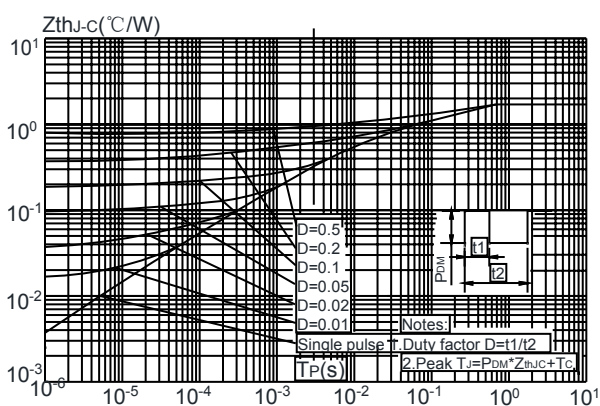
**Figure 9:** Maximum Safe Operating Area



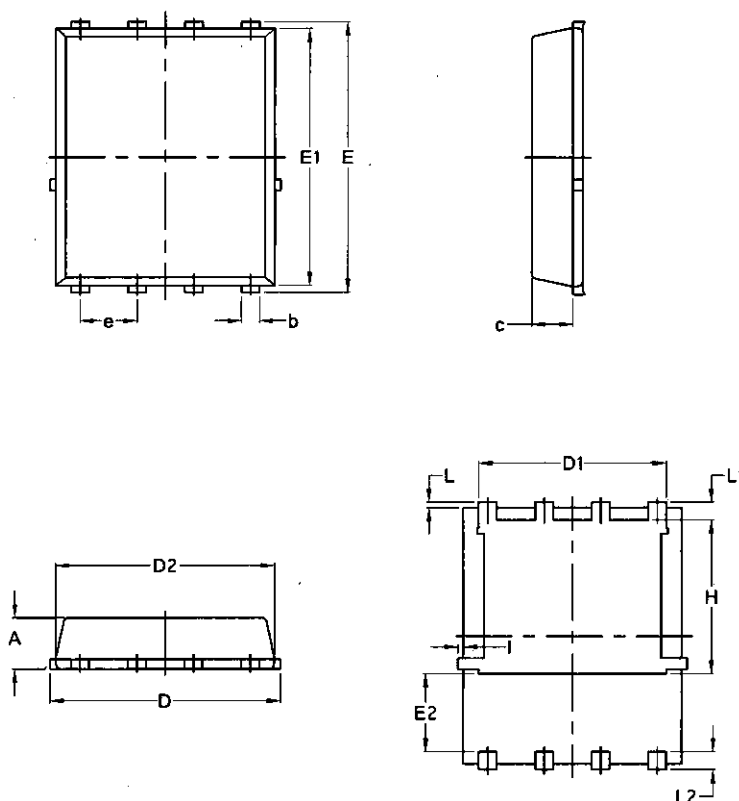
**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature



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



### Package Mechanical Data-PDFN5060-8L-JQ Single



| Symbol | Common   |        |          |        |
|--------|----------|--------|----------|--------|
|        | mm       |        | Inch     |        |
|        | Mim      | Max    | Min      | Max    |
| A      | 1.03     | 1.17   | 0.0406   | 0.0461 |
| b      | 0.34     | 0.48   | 0.0134   | 0.0189 |
| c      | 0.824    | 0.0970 | 0.0324   | 0.082  |
| D      | 4.80     | 5.40   | 0.1890   | 0.2126 |
| D1     | 4.11     | 4.31   | 0.1618   | 0.1697 |
| D2     | 4.80     | 5.00   | 0.1890   | 0.1969 |
| E      | 5.95     | 6.15   | 0.2343   | 0.2421 |
| E1     | 5.65     | 5.85   | 0.2224   | 0.2303 |
| E2     | 1.60     | /      | 0.0630   | /      |
| e      | 1.27 BSC |        | 0.05 BSC |        |
| L      | 0.05     | 0.25   | 0.0020   | 0.0098 |
| L1     | 0.38     | 0.50   | 0.0150   | 0.0197 |
| L2     | 0.38     | 0.50   | 0.0150   | 0.0197 |
| H      | 3.30     | 3.50   | 0.1299   | 0.1378 |
| I      | /        | 0.18   | /        | 0.0070 |