

### Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)MAX}$ | $I_D$ |
|---------------|-----------------|-------|
| 40V           | 5.0mΩ@10V       | 90A   |
|               | 6.5mΩ@4.5V      |       |

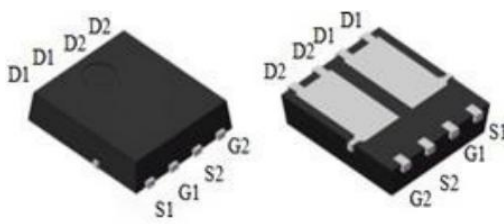
### Feature

- Excellent gate charge x RDS(on) product(FOM)
- Very low on-resistance RDS(on)
- Suffix "-Q1" for AEC-Q101

### Application

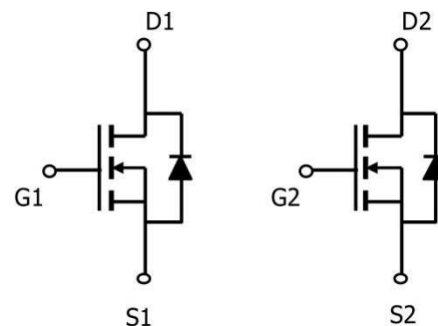
- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

### Package

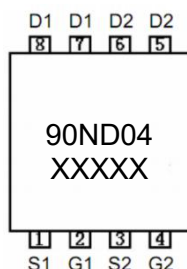


DFN5X6-8L

### Circuit diagram



### Marking



### Absolute maximum ratings (T<sub>c</sub>=25°C unless otherwise noted)

| Parameter                                         | Symbol                 | Value      | Unit |
|---------------------------------------------------|------------------------|------------|------|
| Drain-Source Voltage                              | V <sub>DS</sub>        | 40         | V    |
| Gate-Source Voltage                               | V <sub>GS</sub>        | ±20        | V    |
| Continuous Drain Current                          | I <sub>D</sub>         | 90         | A    |
| Continuous Drain Current(T <sub>c</sub> =100°C)   | I <sub>D</sub> (100°C) | 65         | A    |
| Pulsed Drain Current                              | I <sub>DM</sub>        | 360        | A    |
| Power Dissipation                                 | P <sub>D</sub>         | 83         | W    |
| Thermal Resistance,Junction-to-Case <sup>1)</sup> | R <sub>θJC</sub>       | 1.8        | °C/W |
| Single pulse avalanche energy <sup>4)</sup>       | E <sub>AS</sub>        | 500        | mJ   |
| Junction Temperature                              | T <sub>J</sub>         | 175        | °C   |
| Storage Temperature                               | T <sub>STG</sub>       | -55 ~ +175 | °C   |

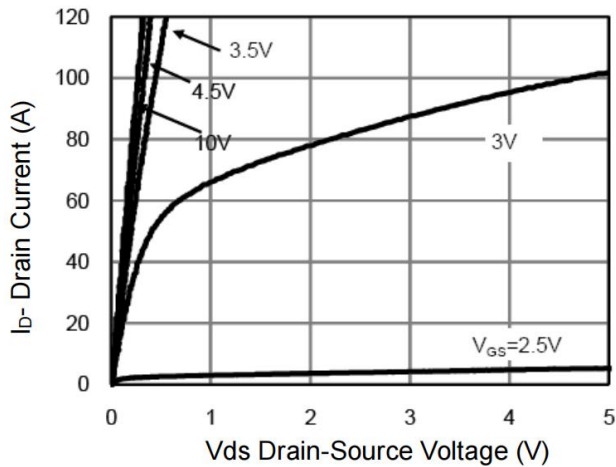
### Electrical characteristics (T<sub>c</sub>=25°C unless otherwise noted)

| 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                                              | 40  |      |      | V    |
| Zero gate voltage drain current          | I <sub>DSS</sub>     | V <sub>DS</sub> =40V,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 <sup>2)</sup>     | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                 | 1.0 | 1.6  | 2.2  | V    |
| Drain-source on-resistance <sup>2)</sup> | R <sub>DS(on)</sub>  | V <sub>GS</sub> =10V, I <sub>D</sub> =20A                                                |     | 4.3  | 5.0  | mΩ   |
|                                          |                      | V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A                                               |     | 5.5  | 6.5  |      |
| Dynamic characteristics <sup>3)</sup>    |                      |                                                                                          |     |      |      |      |
| Input Capacitance                        | C <sub>iss</sub>     | V <sub>DS</sub> =20V, V <sub>GS</sub> =0V, f =1MHz                                       |     | 2300 |      | pF   |
| Output Capacitance                       | C <sub>oss</sub>     |                                                                                          |     | 740  |      |      |
| Reverse Transfer Capacitance             | C <sub>rss</sub>     |                                                                                          |     | 38   |      |      |
| Total Gate Charge                        | Q <sub>g</sub>       | V <sub>DS</sub> =20V, V <sub>GS</sub> =10V, I <sub>D</sub> =20A                          |     | 35   |      | nC   |
| Gate-Source Charge                       | Q <sub>gs</sub>      |                                                                                          |     | 6.2  |      |      |
| Gate-Drain Charge                        | Q <sub>gd</sub>      |                                                                                          |     | 5.1  |      |      |
| Turn-on delay time                       | t <sub>d(on)</sub>   | V <sub>DD</sub> =20V, V <sub>GS</sub> =10V, I <sub>D</sub> =20A,<br>R <sub>G</sub> =1.6Ω |     | 7.5  |      | nS   |
| Turn-on rise time                        | t <sub>r</sub>       |                                                                                          |     | 4.0  |      |      |
| Turn-off delay time                      | t <sub>d(off)</sub>  |                                                                                          |     | 37   |      |      |
| Turn-off fall time                       | t <sub>f</sub>       |                                                                                          |     | 7.5  |      |      |
| Source-Drain Diode characteristics       |                      |                                                                                          |     |      |      |      |
| Diode Forward Current <sup>1)</sup>      | I <sub>S</sub>       |                                                                                          |     |      | 90   | A    |
| Diode Forward voltage <sup>2)</sup>      | V <sub>SD</sub>      | V <sub>GS</sub> =0V, I <sub>S</sub> =20A                                                 |     |      | 1.2  | V    |
| Reverse Recovery Time                    | t <sub>rr</sub>      | T <sub>J</sub> = 25°C, I <sub>F</sub> = I <sub>S</sub><br>di/dt = 100A/μs                |     | 14   |      | nS   |
| Reverse Recovery Charge                  | Q <sub>rr</sub>      |                                                                                          |     | 21   |      | nC   |

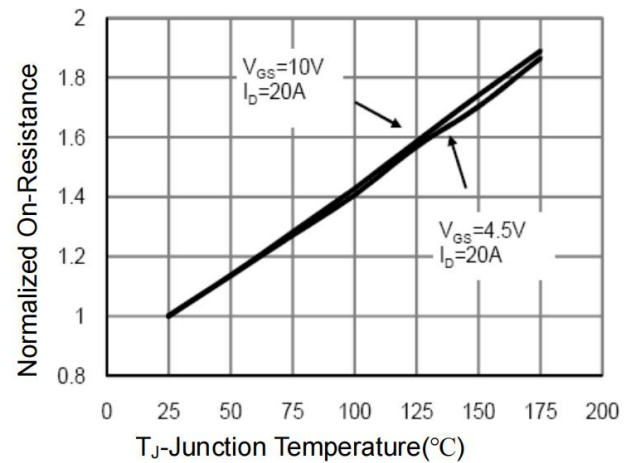
Notes:

- 1) Surface Mounted on FR4 Board, t ≤ 10 sec.
- 2) Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
- 3) Guaranteed by design, not subject to production.
- 4) EAS condition : T<sub>J</sub>=25 ,V °C DD=20V,V<sub>G</sub>=10V,L=0.5mH,R<sub>G</sub>=25Ω.

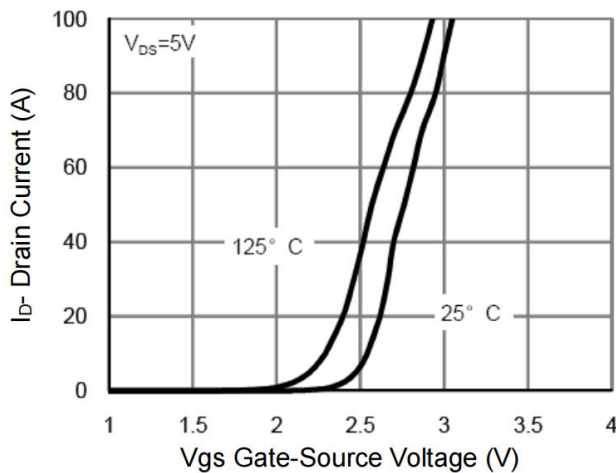
## Typical Characteristics



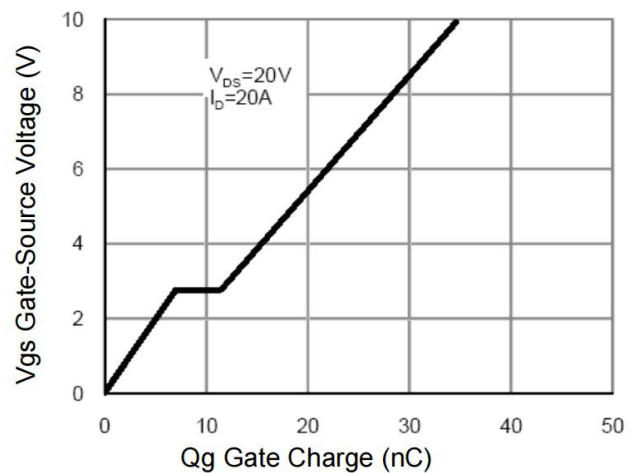
**Figure 1 Output Characteristics**



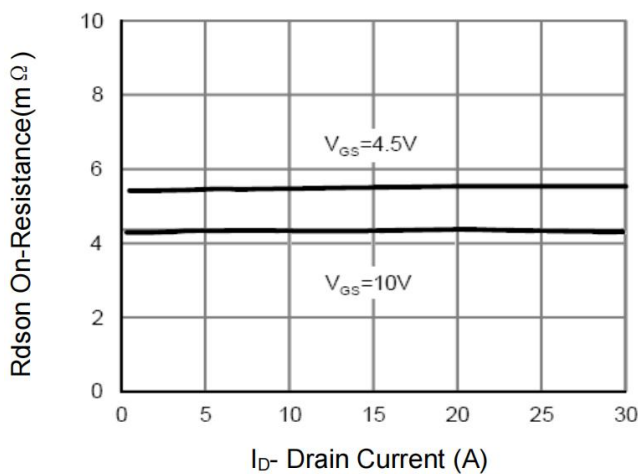
**Figure 2 Rdson-Junction Temperature**



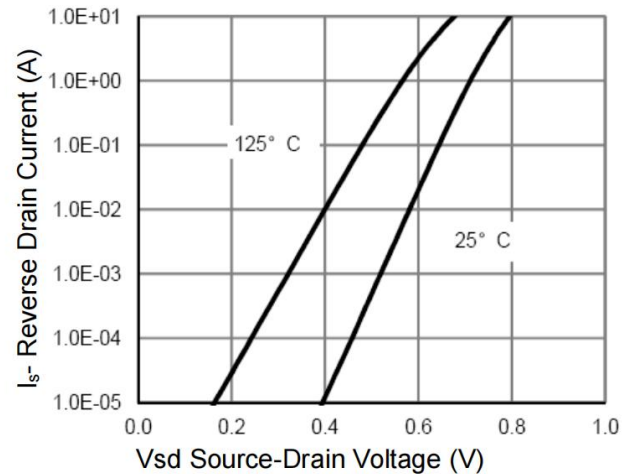
**Figure 3 Transfer Characteristics**



**Figure 4 Gate Charge**

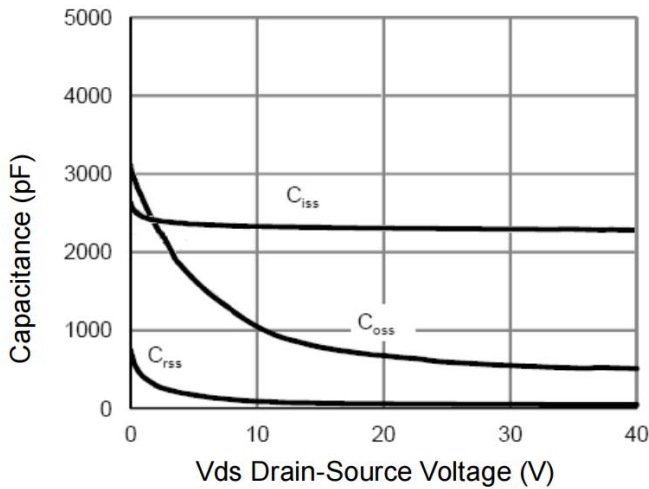


**Figure 5 Rdson- Drain Current**

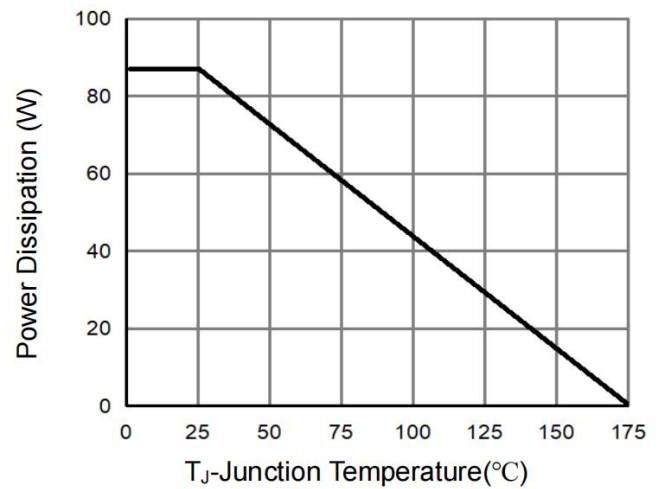


**Figure 6 Source- Drain Diode Forward**

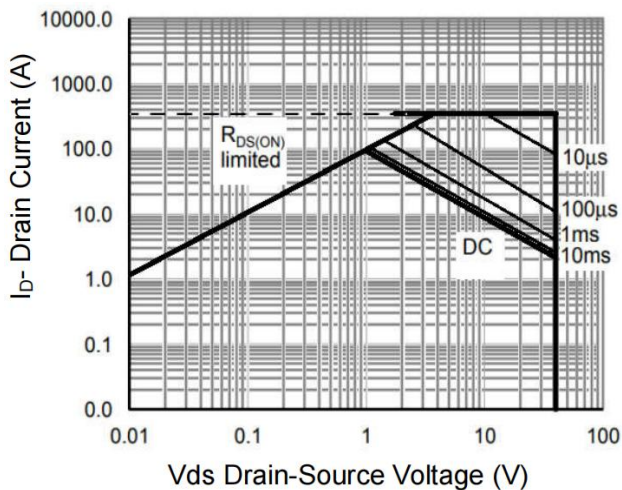
## Typical Characteristics



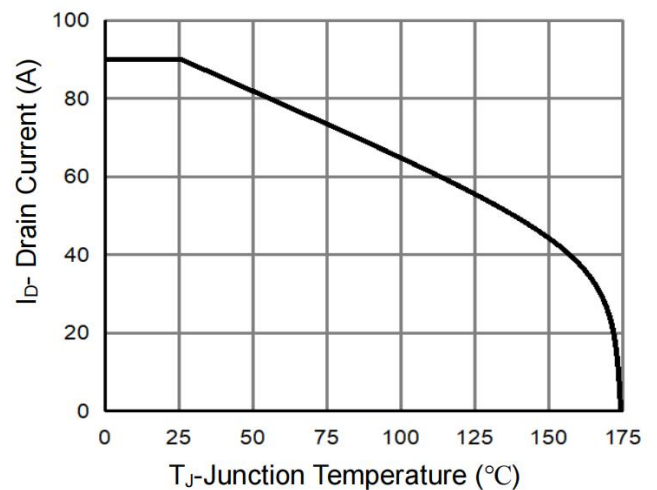
**Figure 7 Capacitance vs Vds**



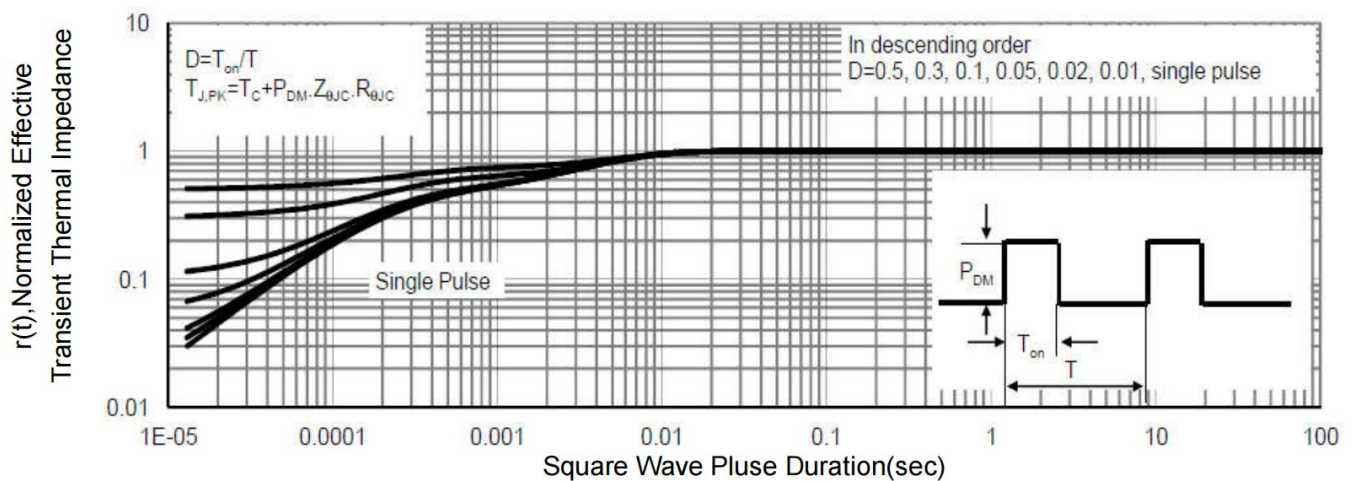
**Figure 8 Power De-rating**



**Figure 9 Safe Operation Area**

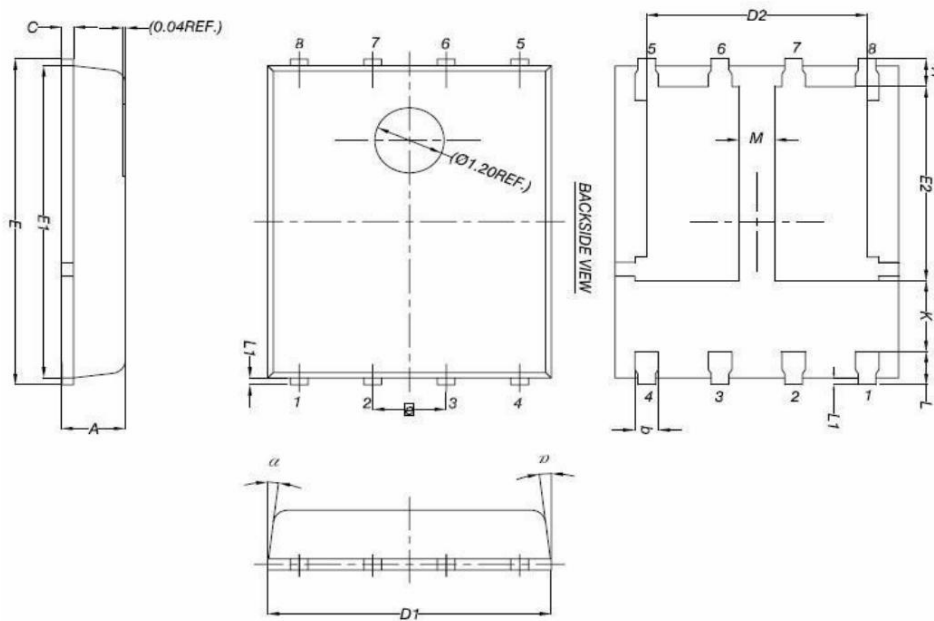


**Figure 10 Current De-rating**



**Figure 11 Normalized Maximum Transient Thermal Impedance**

### DFN5X6-8L Package Information



| Symbol | Dimensions In Millimeters |      | Dimensions In Inches |       |
|--------|---------------------------|------|----------------------|-------|
|        | Min.                      | Max. | Min.                 | Max.  |
| A      | 0.90                      | 1.10 | 0.035                | 0.043 |
| b      | 0.33                      | 0.51 | 0.013                | 0.020 |
| C      | 0.20                      | 0.30 | 0.008                | 0.012 |
| D1     | 4.80                      | 5.00 | 0.189                | 0.197 |
| D2     | 3.61                      | 3.96 | 0.142                | 0.156 |
| E      | 5.90                      | 6.10 | 0.232                | 0.240 |
| E1     | 5.70                      | 5.90 | 0.224                | 0.232 |
| E2     | 3.37                      | 3.78 | 0.133                | 0.149 |
| e      | 1.27BSC.                  |      | 1.27BSC.             |       |
| H      | 0.41                      | 0.61 | 0.016                | 0.024 |
| K      | 1.10                      | -    | 0.043                | -     |
| L      | 0.51                      | 0.71 | 0.020                | 0.028 |
| L1     | 0.06                      | 0.20 | 0.002                | 0.008 |
| M      | 0.50                      | -    | 0.020                | -     |
| a      | 0°                        | 12°  | 0°                   | 12°   |