

## N-Channel Enhancement Mode MOSFET

### 1. Product Information

#### 1.1 Features

- ☑ Advanced Trench Technology
- ☑ Low Thermal Resistance

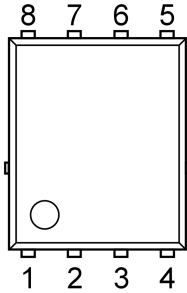
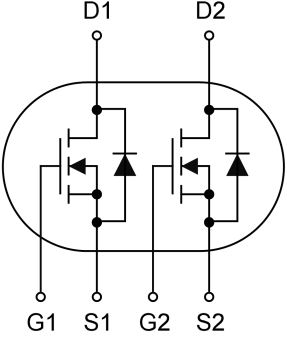
#### 1.2 Applications

- ☑ Motor drivers
- ☑ DC-DC Converter

#### 1.3 Quick reference

- ☑  $BV \geq 40\text{ V}$
- ☑  $P_{tot} \leq 20.8\text{ W}$
- ☑  $I_D \leq 40\text{ A}$
- ☑  $R_{DS(ON)} \leq 7\text{ m}\Omega @ V_{GS} = 10\text{ V}$
- ☑  $R_{DS(ON)} \leq 11\text{ m}\Omega @ V_{GS} = 4.5\text{ V}$

### 2. Pin Description

| Pin  | Description | Simplified Outline                                                                                                 | Symbol                                                                                |
|------|-------------|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1    | Source (S1) |  <p>Top View<br/>PDFN5x6-8L</p> |  |
| 2    | Gate (G1)   |                                                                                                                    |                                                                                       |
| 3    | Source (S2) |                                                                                                                    |                                                                                       |
| 4    | Gate (G2)   |                                                                                                                    |                                                                                       |
| 5, 6 | Drain (D2)  |                                                                                                                    |                                                                                       |
| 7, 8 | Drain (D1)  |                                                                                                                    |                                                                                       |

## 3. Limiting Values

| Symbol          | Parameter                                        | Conditions                                    | Min | Max      | Unit                 |
|-----------------|--------------------------------------------------|-----------------------------------------------|-----|----------|----------------------|
| $V_{DS}$        | Drain-Source Voltage                             | $T_C=25^{\circ}\text{C}$                      | 40  | -        | V                    |
| $V_{GS}$        | Gate-Source Voltage                              | $T_C=25^{\circ}\text{C}$                      | -   | $\pm 20$ | V                    |
| $I_D$           | Drain Current (DC)                               | $T_C=25^{\circ}\text{C}, V_{GS}=10\text{ V}$  | -   | 40       | A                    |
|                 |                                                  | $T_C=100^{\circ}\text{C}, V_{GS}=10\text{ V}$ | -   | 26       | A                    |
| $I_{DM}^*$      | Pulsed Source Current                            | $T_C=25^{\circ}\text{C}, V_{GS}=10\text{ V}$  | -   | 120      | A                    |
| $P_{tot}$       | Total Power Dissipation                          | $T_C=25^{\circ}\text{C}$                      | -   | 20.8     | W                    |
| $T_J, T_{stg}$  | Operating Junction and Storage Temperature Range |                                               | -55 | 150      | $^{\circ}\text{C}$   |
| $E_{AS}$        | Single Pulsed Avalanche Energy                   | $V_{DD}=40\text{ V}, L=0.3\text{ mH}$         | -   | 51       | mJ                   |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient          |                                               | -   | 62.5     | $^{\circ}\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case             |                                               | -   | 6        |                      |

Notes:

- \* Pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- \*\* Surface mounted on 1 in<sup>2</sup> pad area,  $t \leq 10\text{ sec}$ .
- \*\*\* Limited by maximum junction temperature.

## 4. Marking Information

| Product Name | Marking                                                                                              |
|--------------|------------------------------------------------------------------------------------------------------|
| KJ0604DG     | <div style="border: 1px solid black; padding: 2px; display: inline-block;">KJ0604DG<br/>XXXXXX</div> |

## 5. Ordering Code

| Product Name | Package     | Reel size | Tape width | Quantity (pcs) |
|--------------|-------------|-----------|------------|----------------|
| KJ0604DG     | PDFN 5×6-8L | 13"       | 12 mm      | 5000           |

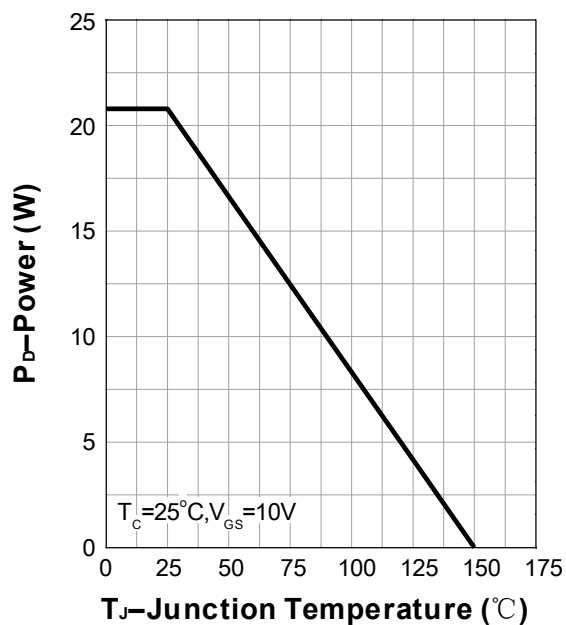
Note: KUAIJIE XIN defines "Green" as lead-free (RoHS compliant) and halogen free (Br or Cl does not exceed 900 ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500 ppm by weight; Follow IEC 61249-2-21 and IPC/JEDEC J-STD-020C).

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

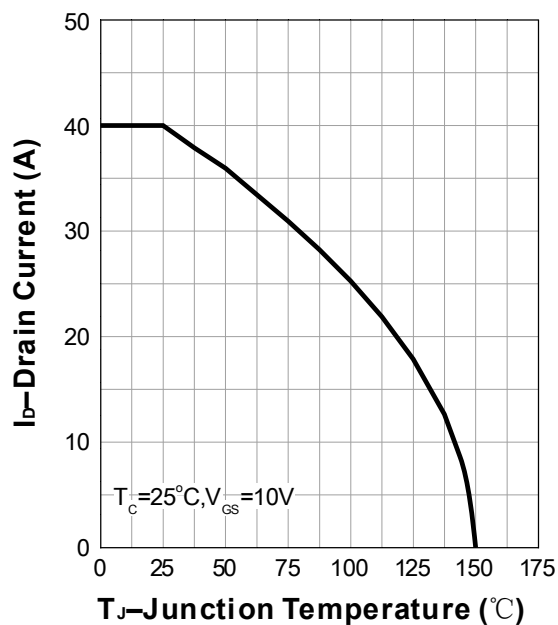
| Symbol                      | Parameter                       | Conditions                                                                                   | Min | Typ | Max  | Unit |
|-----------------------------|---------------------------------|----------------------------------------------------------------------------------------------|-----|-----|------|------|
| Static Characteristics      |                                 |                                                                                              |     |     |      |      |
| BV <sub>DSS</sub>           | Drain-Source Breakdown Voltage  | V <sub>GS</sub> =0 V, I <sub>DS</sub> =250 μA                                                | 40  | -   | -    | V    |
| V <sub>GS(th)</sub>         | Gate Threshold Voltage          | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250 μA                                   | 1.0 | -   | 2.2  | V    |
| I <sub>DSS</sub>            | Zero Gate Voltage Drain Current | V <sub>DS</sub> =40 V, V <sub>GS</sub> =0 V                                                  | -   | -   | 1    | μA   |
| I <sub>GSS</sub>            | Gate Leakage Current            | V <sub>DS</sub> =0 V, V <sub>GS</sub> =±20 V                                                 | -   | -   | ±100 | nA   |
| R <sub>DS(ON)</sub>         | On-State Resistance             | V <sub>GS</sub> =10 V, I <sub>DS</sub> =15 A                                                 | -   | 6   | 7    | mΩ   |
|                             |                                 | V <sub>GS</sub> =4.5 V, I <sub>DS</sub> =12 A                                                | -   | 8.5 | 11   |      |
| Diode Characteristics       |                                 |                                                                                              |     |     |      |      |
| V <sub>SD</sub>             | Diode Forward Voltage           | I <sub>SD</sub> =15 A, V <sub>GS</sub> =0 V                                                  | -   | 0.8 | 1.2  | V    |
| t <sub>rr</sub>             | Reverse Recovery Time           | I <sub>DS</sub> =15 A, V <sub>GS</sub> =0V,<br>dI <sub>SD</sub> /dt=100 A/μs                 | -   | 21  | -    | ns   |
| Q <sub>rr</sub>             | Reverse Recovery Charge         |                                                                                              | -   | 7   | -    | nC   |
| Dynamic Characteristics     |                                 |                                                                                              |     |     |      |      |
| C <sub>iss</sub>            | Input Capacitance               | V <sub>GS</sub> =0 V, V <sub>DS</sub> =20 V,<br>Frequency=1.0 MHz                            | -   | 630 | -    | pF   |
| C <sub>oss</sub>            | Output Capacitance              |                                                                                              | -   | 330 | -    |      |
| C <sub>rss</sub>            | Reverse Transfer Capacitance    |                                                                                              | -   | 23  | -    |      |
| R <sub>g</sub>              | Gate resistance                 |                                                                                              | -   | 4   | -    | Ω    |
| t <sub>d(on)</sub>          | Turn-on Delay Time              | V <sub>DS</sub> =20 V, V <sub>GEN</sub> =10 V,<br>R <sub>G</sub> =3 Ω, I <sub>DS</sub> =15 A | -   | 12  | -    | ns   |
| t <sub>r</sub>              | Turn-on Rise Time               |                                                                                              | -   | 32  | -    |      |
| t <sub>d(off)</sub>         | Turn-off Delay Time             |                                                                                              | -   | 20  | -    |      |
| t <sub>f</sub>              | Turn-off Fall Time              |                                                                                              | -   | 8   | -    |      |
| Gate Charge Characteristics |                                 |                                                                                              |     |     |      |      |
| Q <sub>g</sub>              | Total Gate Charge               | V <sub>DS</sub> =20 V, V <sub>GS</sub> =10 V,<br>I <sub>DS</sub> =15 A                       | -   | 17  | -    | nC   |
| Q <sub>gs</sub>             | Gate-Source Charge              |                                                                                              | -   | 5   | -    |      |
| Q <sub>gd</sub>             | Gate-Drain Charge               |                                                                                              | -   | 4   | -    |      |

## 7. Typical Characteristics

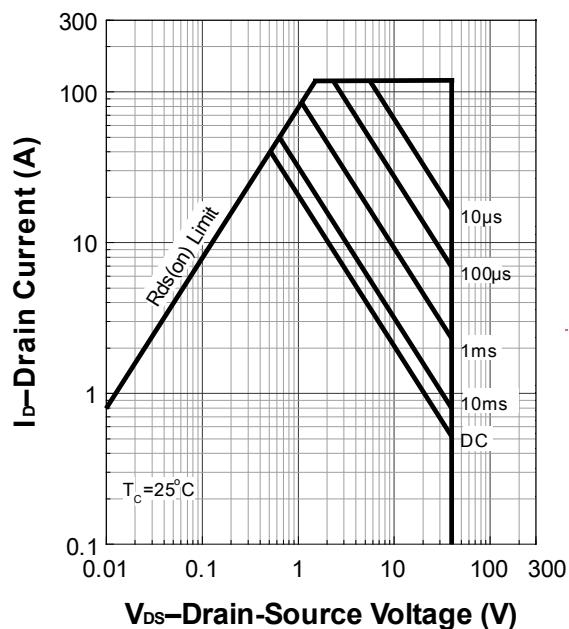
**Power Capability**



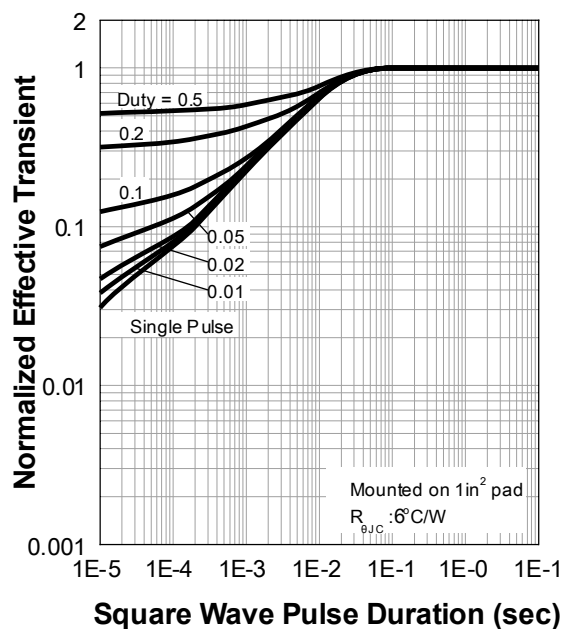
**Current Capability**



**Safe Operating Area**

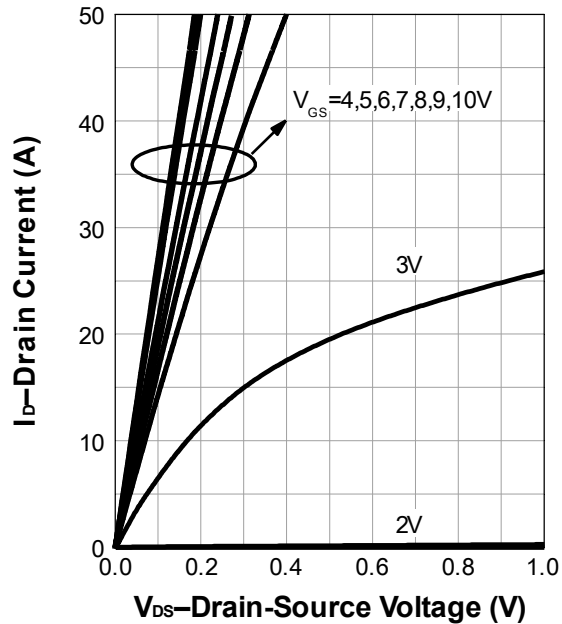


**Transient Thermal Impedance**

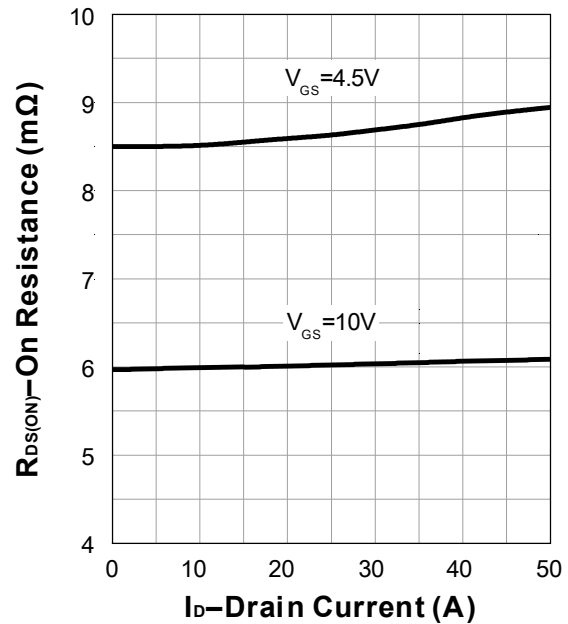


## 7. Typical Characteristics (cont.)

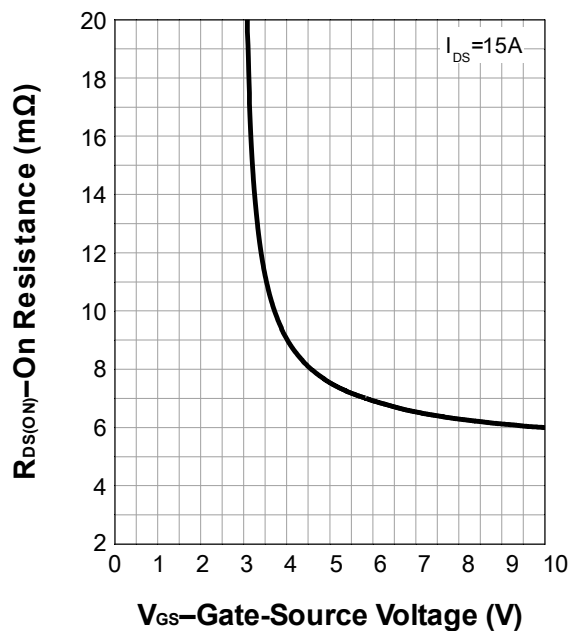
**Output Characteristics**



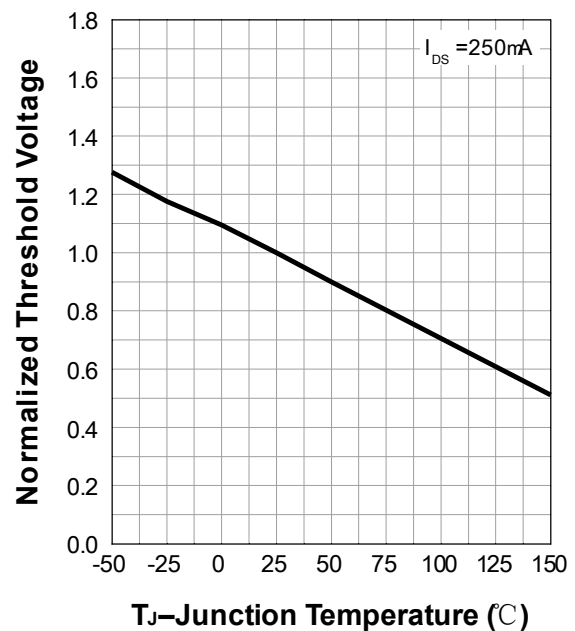
**On Resistance**



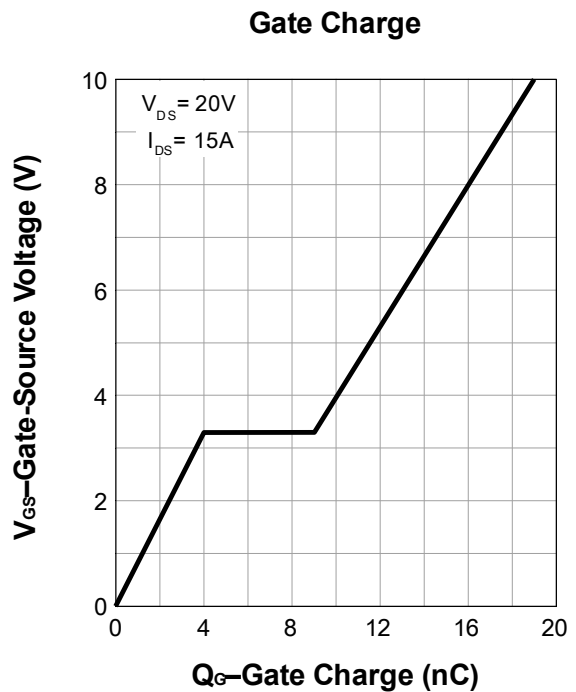
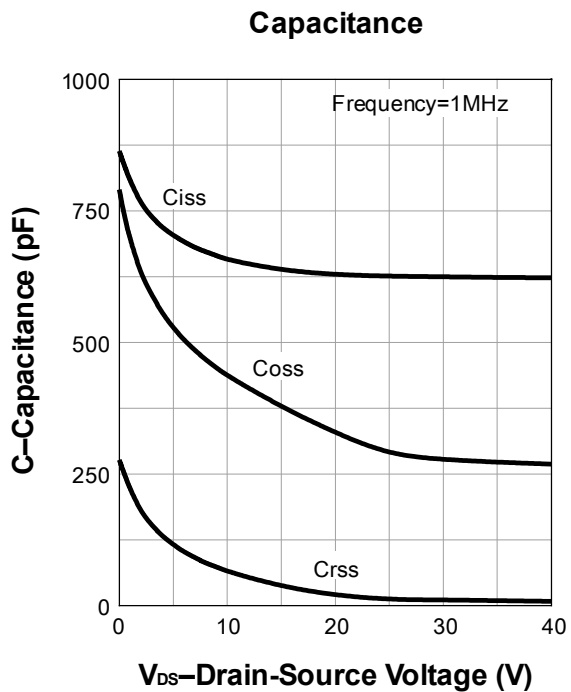
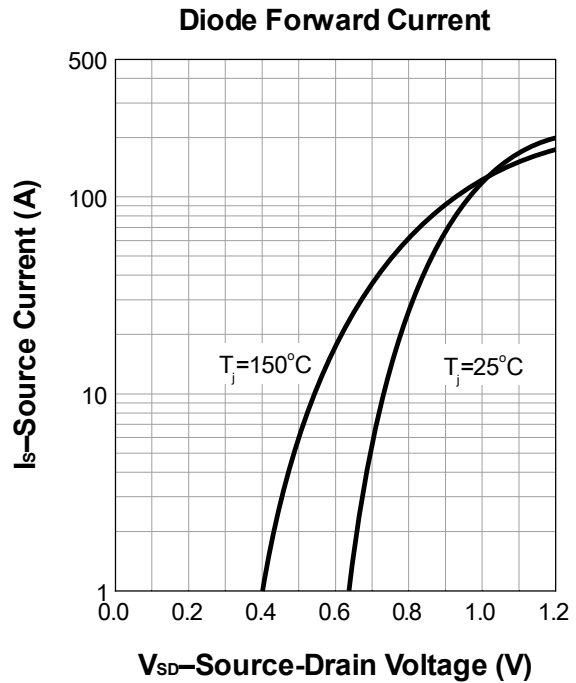
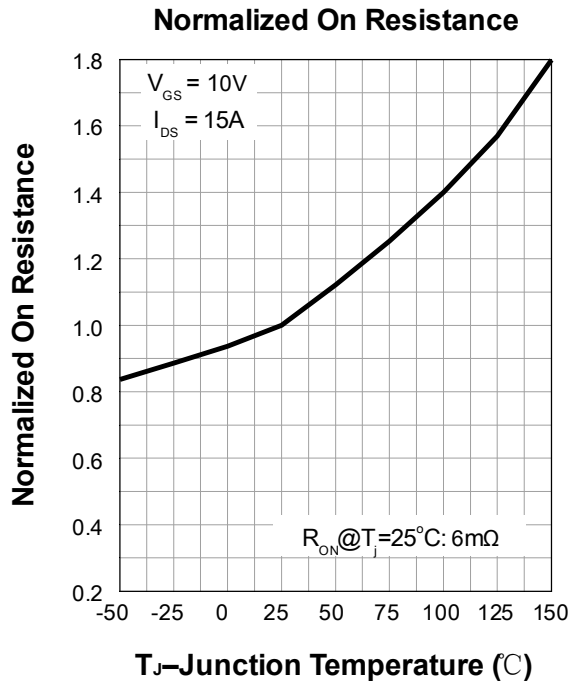
**Transfer Characteristics**



**Normalized Threshold Voltage**

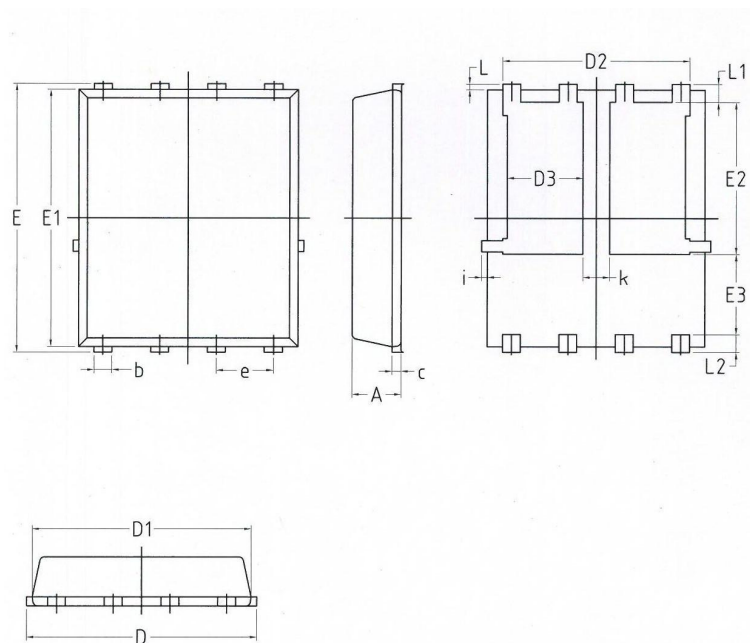


## 7. Typical Characteristics (cont.)



## 8. Package Dimensions

### PDFN 5x6-8L Package



| Symbol | Dimensions In Millimeters |      |
|--------|---------------------------|------|
|        | MIN                       | MAX  |
| A      | 1.03                      | 1.17 |
| B      | 0.34                      | 0.48 |
| c      | 0.203 BSC                 |      |
| D      | 4.80                      | 5.40 |
| D1     | 4.80                      | 5.00 |
| D2     | 4.11                      | 4.31 |
| D3     | 1.60                      | 1.80 |
| E      | 5.95                      | 6.15 |
| E1     | 5.65                      | 5.85 |
| E2     | 3.30                      | 3.50 |
| E3     | 1.70                      | -    |
| e      | 1.27 BSC                  |      |
| L      | 0.05                      | 0.25 |
| L1     | 0.38                      | 0.5  |
| L2     | 0.38                      | 0.5  |
| i      | -                         | 0.18 |
| k      | 0.5                       | 0.7  |