



40V/160A N-Channel Advanced Power MOSFET

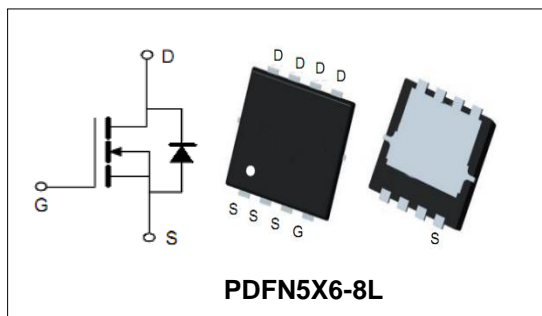
Features

- Fast switching capability
- Robust design with better EAS performance
- EMI Improved

Applications

- Server/Telecom
- High Power Supply
- E-Tools
- Motor Driver
- BMS

|                |     |    |
|----------------|-----|----|
| BVDSS          | 40  | V  |
| ID             | 160 | A  |
| RDSON@VGS=10V  | 1.5 | mΩ |
| RDSON@VGS=4.5V | 2.3 | mΩ |



Order Information

| Product   | Package    | Marking   | Reel Size | Reel    | Carton   |
|-----------|------------|-----------|-----------|---------|----------|
| PGN04N015 | PDFN5X6-8L | PGN04N015 | 13inch    | 5000PCS | 50000PCS |

Absolute Maximum Ratings

| Symbol   | Parameter  | Rating     | Unit |
|--|--|------------|------|
| <b>Common Ratings (TC=25°C Unless Otherwise Noted)</b> |  |            |      |
| V <sub>(BR)DSS</sub>                                   | Drain-Source Breakdown Voltage                     | 40         | V    |
| V <sub>GS</sub>  | Gate-Source Voltage                                | ±20        | V    |
| T <sub>J</sub>   | Maximum Junction Temperature                       | 150        | °C   |
| T <sub>STG</sub>                                       | Storage Temperature Range                          | -55 to 150 | °C   |
| I <sub>S</sub>   | Diode Continuous Forward Current                   | TC =25°C   | 150  |
| <b>Mounted on Large Heat Sink</b>                      |  |            |      |
| E <sub>AS</sub>  | Single Pulse Avalanche Energy (Note1)              | 130        | mJ   |
| I <sub>DM</sub>  | Pulse Drain Current Tested (Silicon Limit) (Note2) | TC =25°C   | 480  |
| I <sub>D</sub>   | Continuous Drain current@VGS=10V                   | TC =25°C   | 160  |
| P <sub>D</sub>   | Maximum Power Dissipation                          | TC =25°C   | 83   |
| R <sub>θJa</sub>                                       | Thermal Resistance Junction-to-Ambient (Note3)     | 65         | °C/W |
| R <sub>θJc</sub>                                       | Thermal Resistance Junction-to-Case (Note3)        | 1.5        |      |



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| Symbol   | Parameter                                | Condition   | Min. | Typ. | Max. | Unit |
|--|--|---|------|------|------|------|
| <b>Static Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>          |  |   |      |      |      |      |
| V <sub>(BR)DSS</sub>   | Drain- Source Breakdown Voltage          | VGS=0V ID=250μA   | 40   | --   | --   | V    |
| I <sub>DSS</sub>   | Zero Gate Voltage Drain current(Tc=25°C) | VDS=32V,VGS=0V  | --   | --   | 1    | μA   |
| I <sub>GSS</sub>   | Gate-Body Leakage Current                | VGS=±20V,VDS=0V   | --   | --   | ±100 | nA   |
| V <sub>GS(TH)</sub>  | Gate Threshold Voltage                   | VDS=VGS,ID=250μA  | 1.0  | 1.8  | 2.5  | V    |
| R <sub>DS(ON)</sub>  | Drain-Source On-State Resistance (Note4) | VGS=10V, ID=30A   | --   | 1.5  | 2    | Ω    |
| R <sub>DS(ON)</sub>  | Drain-Source On-State Resistance (Note4) | VGS=4.5V, ID=20A  | --   | 2.3  | 2.9  | Ω    |
| <b>Dynamic Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated) (Note5)</b> |  |   |      |      |      |      |
| C <sub>iss</sub>   | Input Capacitance                        | VDS=20V,<br>VGS=0V,<br>F=1MHz                                 | --   | 3160 | --   | pF   |
| C <sub>oss</sub>   | Output Capacitance                       |   | --   | 1100 | --   | pF   |
| C <sub>rss</sub>   | Reverse Transfer Capacitance             |   | --   | 150  | --   | pF   |
| Q <sub>g</sub>   | Total Gate Charge                        | VDS=20V,<br>ID=75A,<br>VGS=10V                                | --   | 95   | --   | nC   |
| Q <sub>gs</sub>  | Gate-Source Charge                       |   | --   | 15   | --   | nC   |
| Q <sub>gd</sub>  | Gate-Drain Charge                        |   | --   | 11   | --   | nC   |
| <b>Switching Characteristics (Note5)</b>   |  |   |      |      |      |      |
| t <sub>d(on)</sub>   | Turn-on Delay Time                       | VDS=20V,<br>ID=75A,<br>RG=3.9Ω,<br>VGS=10V                    | --   | 12.5 | --   | nS   |
| t <sub>r</sub>   | Turn-on Rise Time                        |   | --   | 7    | --   | nS   |
| t <sub>d(off)</sub>  | Turn-off Delay Time                      |   | --   | 50   | --   | nS   |
| t <sub>f</sub>   | Turn-off Fall Time                       |   | --   | 8.5  | --   | nS   |
| <b>Source- Drain Diode Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>        |  |   |      |      |      |      |
| V <sub>SD</sub>  | Forward on voltage                       | IS=30A,VGS=0V   | --   | 0.84 | 1.2  | V    |
| t <sub>rr</sub>  | Reverse Recovery Time                    | Tj=25°C , I <sub>SD</sub> = 140A<br>ISD=30A,<br>Di/dt=100A/us | --   | 31   | --   | ns   |
| Q <sub>rr</sub>  | Reverse Recovery Charge                  |   | --   | 110  | --   | nc   |

Note:

- Limited by T<sub>Jmax</sub>, starting T<sub>J</sub> = 25° C, R<sub>G</sub> =25Ω, VDS =20V, VGS =10V. Part not recommended for use above this value.
- Repetitive Rating: Pulse width limited by maximum junction temperature.
- Surface Mounted on FR4 Board, t ≤ 10 sec.
- Pulse Test: pulse width ≤ 300 us, duty cycle ≤ 2%.
- Guaranteed by design, not subject to production testing.



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Typical Performance Characteristics

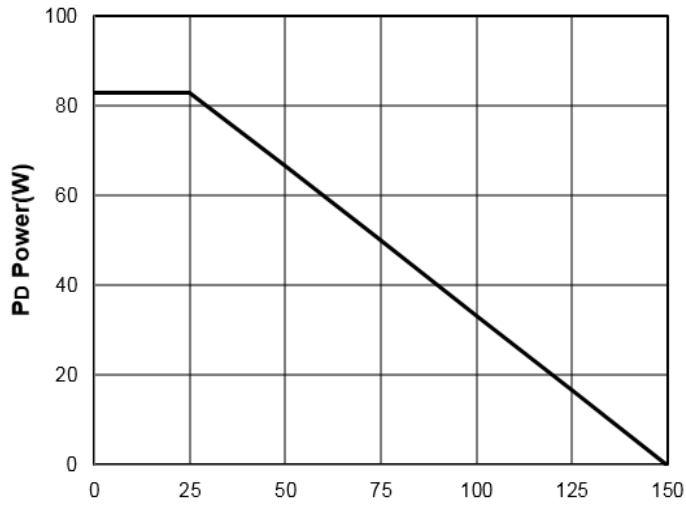


Figure1: Tj Junction Temperature (°C)

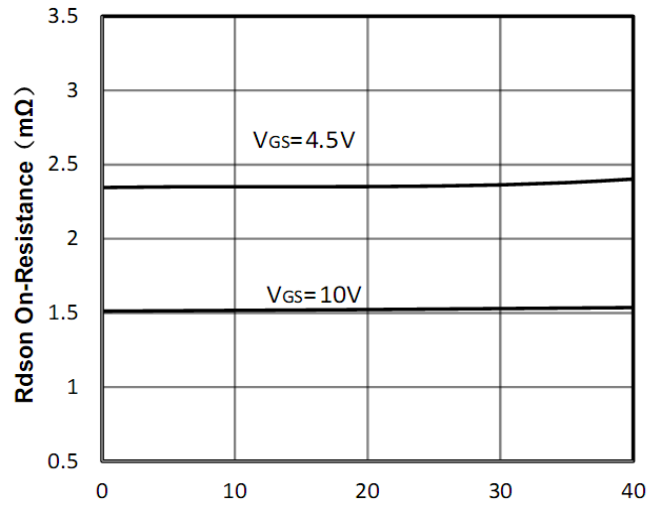


Figure2: Id Drain Current (A)

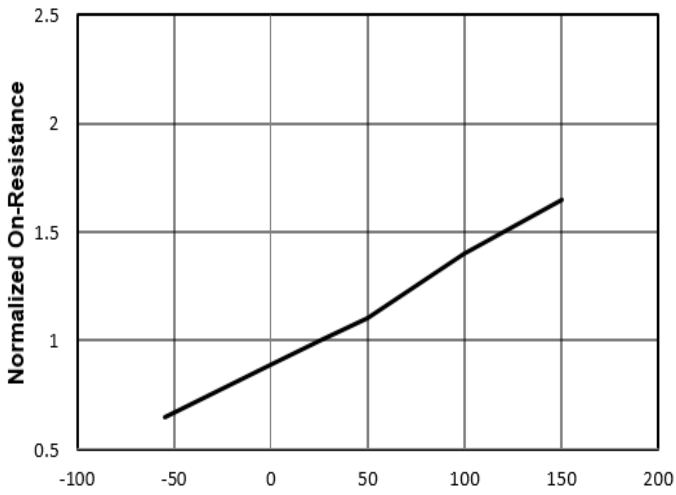


Figure3: Tj Junction Temperature (°C)

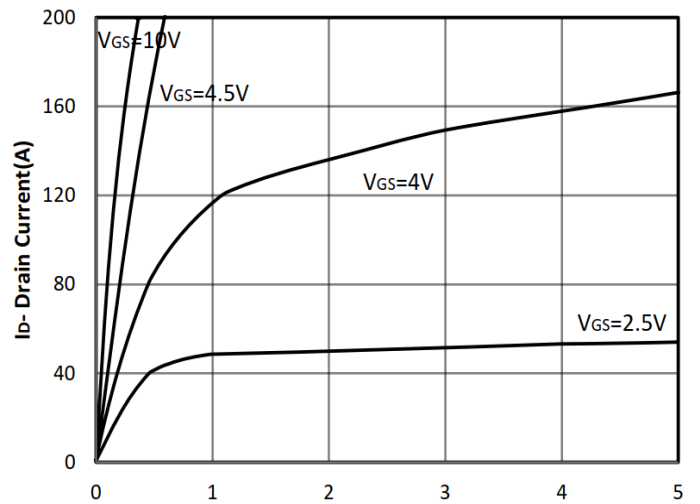
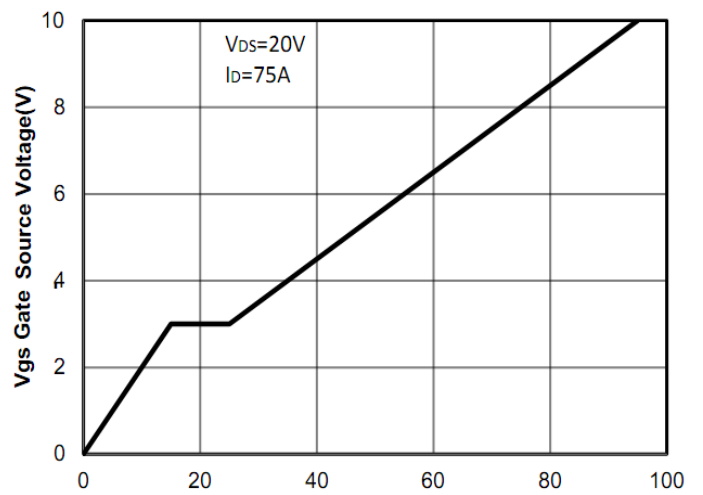
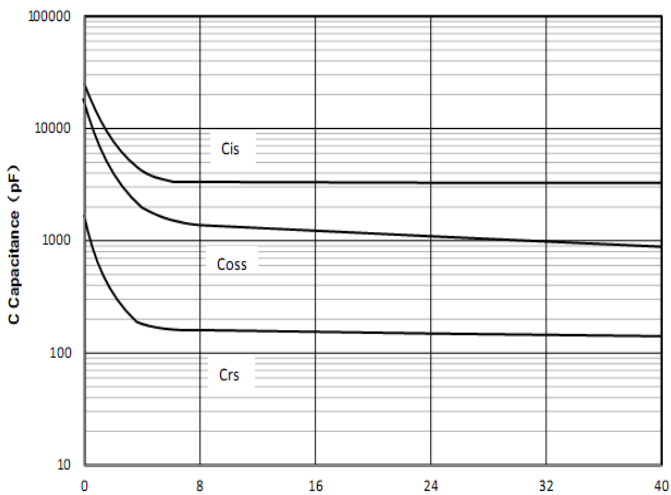


Figure4: Vds Drain-Source Voltage (V)





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Figure5:  $V_{DS}$  Drain-Source Voltage (V)

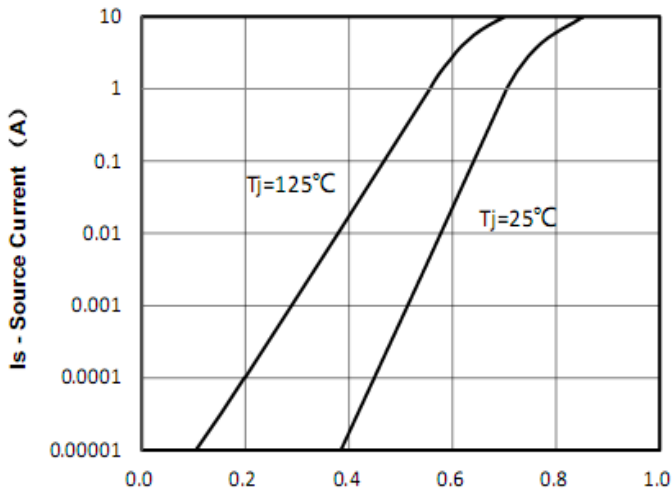


Figure6:  $Q_g$  Gate Charge (nC)

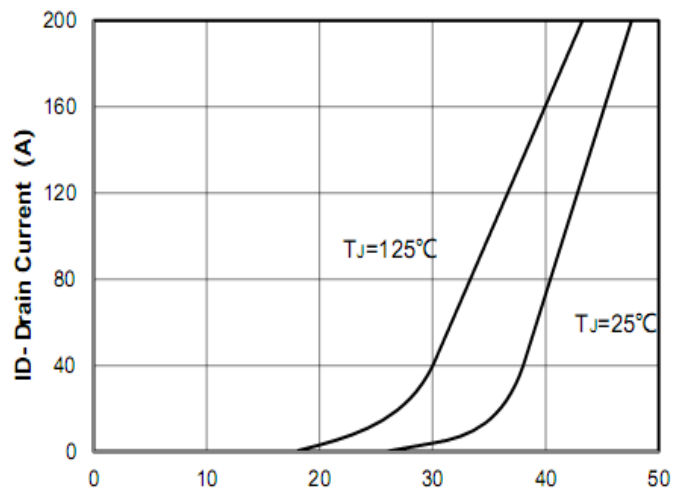


Figure7:  $V_{SD}$  Source-Drain Voltage (V)

Figure8:  $V_{GS}$  Gate-Source Voltage (V)

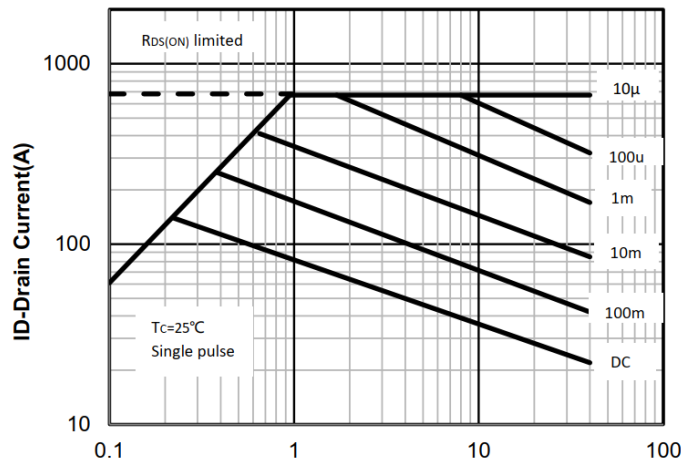


Figure9:  $V_{SD}$  Drain -Source Voltage (V)

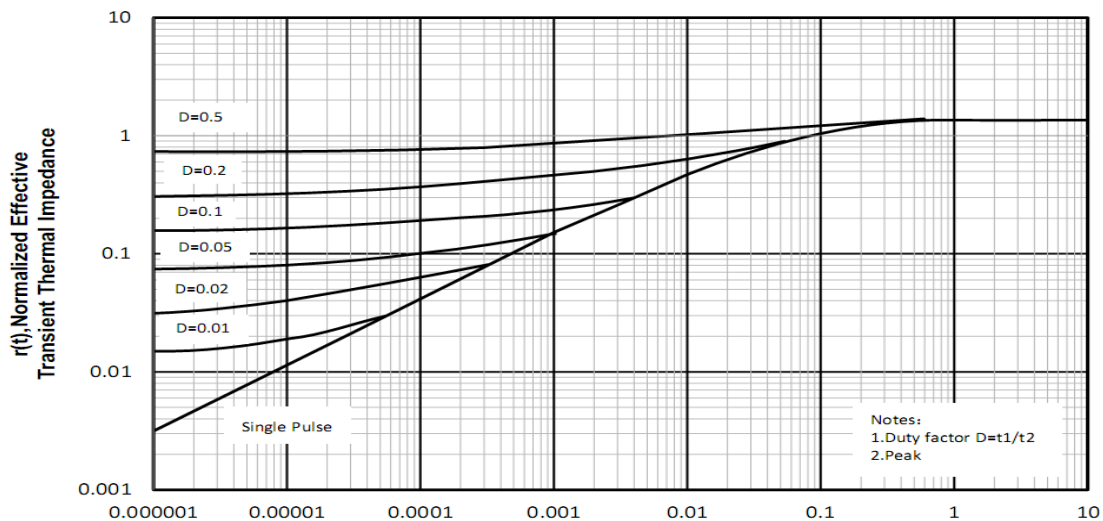


Figure10: Square Wave Pulse Duration (sec)

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Test Circuit and Waveform:

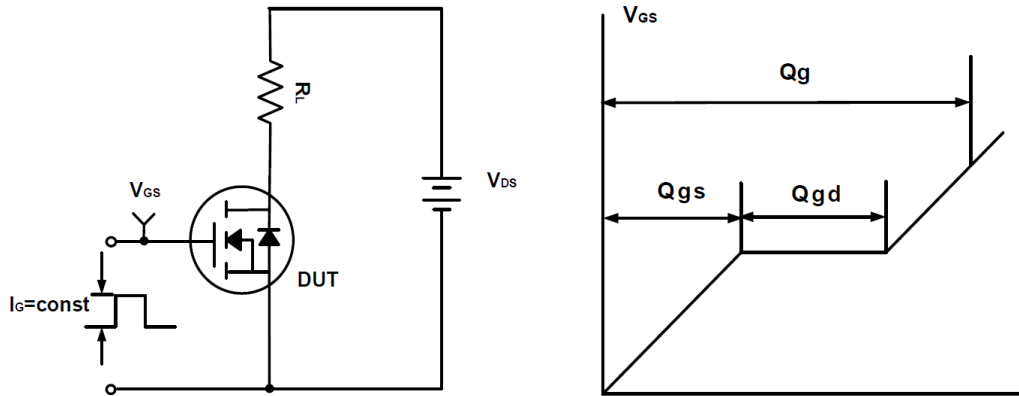


Figure A Gate Charge Test Circuit & Waveforms

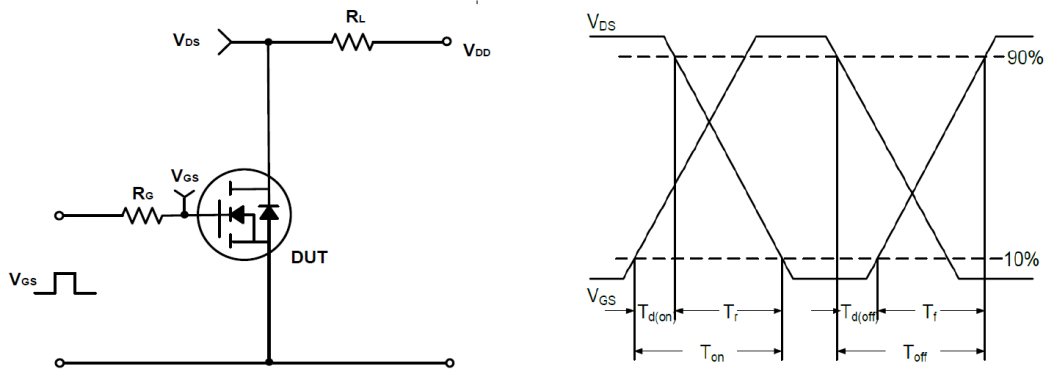


Figure B Switching Test Circuit & Waveforms

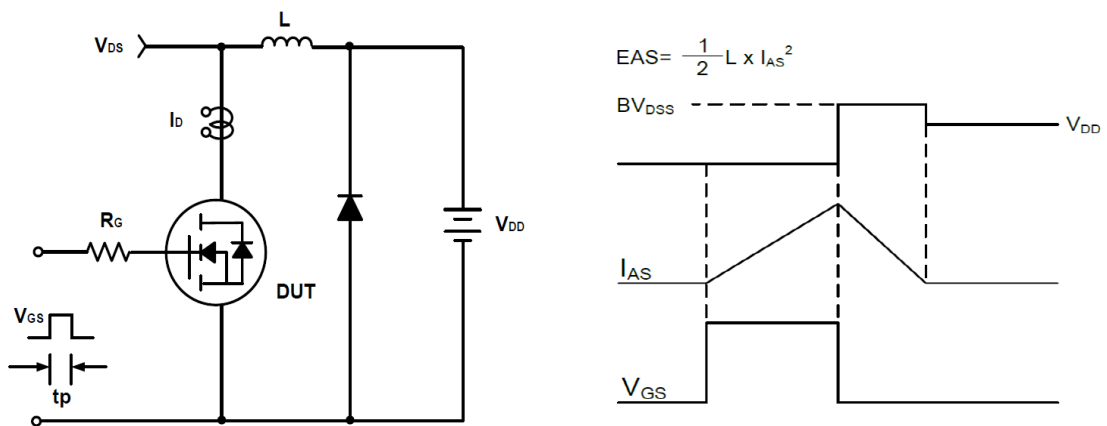
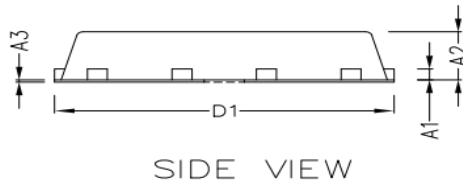


Figure C Unclamped Inductive Switching Circuit & Waveforms

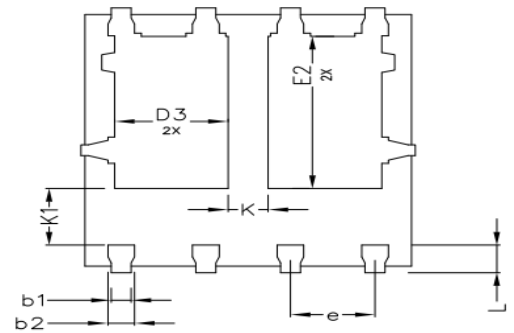


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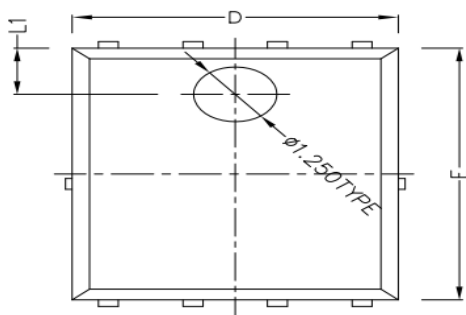
PDFN5X6-8L Package Outline Dimensions (Units: mm)



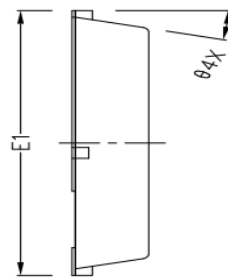
SIDE VIEW



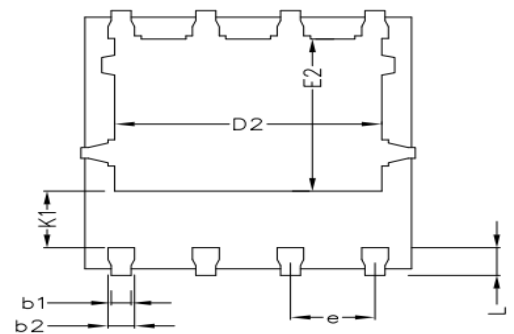
BOTTOM VIEW  
OPTION 2



TOP VIEW



SIDE VIEW



BOTTOM VIEW  
OPTION 1

| COMMON DIMENSIONS<br>(UNITS OF MEASURE IS mm) |            |        |       |
|---|------------|--------|-------|
|   | MIN        | NORMAL | MAX   |
| A1  | 0.254 BSC  |        |       |
| A2  | 1.000      | 1.100  | 1.200 |
| A3  | 0.005      | -      | 0.020 |
| b1  | 0.250      | 0.300  | 0.350 |
| b2  | 0.350      | 0.400  | 0.450 |
| D   | 4.800      | 4.900  | 5.000 |
| D1  | 5.000      | 5.100  | 5.200 |
| D2  | 3.910      | 4.010  | 4.110 |
| D3  | 1.605      | 1.705  | 1.805 |
| E   | 5.650      | 5.750  | 5.850 |
| E1  | 5.950      | 6.050  | 6.150 |
| E2  | 3.375      | 3.475  | 3.575 |
| e   | 1.270 TYPE |        |       |
| L   | 0.530      | 0.630  | 0.730 |
| L1  | 1.00REF    |        |       |
| θ   | 13° TYPE   |        |       |
| K   | 0.600 REF  |        |       |
| K1  | 1.235 REF  |        |       |