

# P-Channel Enhancement Mode MOSFET

## 1. Product Information

### 1.1 Features

- ☒ Surface-mounted package
- ☒ Low Thermal Resistance

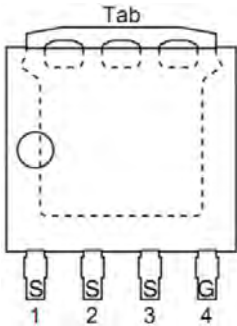
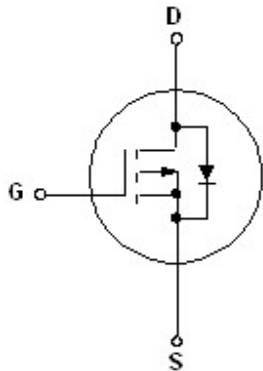
### 1.2 Applications

- ☒ Motor drivers
- ☒ DC - DC Converter

### 1.3 Quick reference

- ☒  $BV \geq -100\text{ V}$
- ☒  $R_{DS(ON)} \leq 19\text{ m}\Omega @ V_{GS} = -10\text{ V}$
- ☒  $P_{tot} \leq 375\text{ W}$
- ☒  $R_{DS(ON)} \leq 22\text{ m}\Omega @ V_{GS} = -4.5\text{ V}$
- ☒  $I_D \leq -90\text{ A}$

## 2. Pin Description

| Pin   | Description | Simplified Outline                                                                                                                        | Symbol                                                                                |
|-------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1,2,3 | Source      |  <p style="text-align: center;">Top View<br/>LFPAK</p> |  |
| 4     | Gate        |                                                                                                                                           |                                                                                       |
| Tab   | Drain       |                                                                                                                                           |                                                                                       |

## 3. Limiting Values

| Symbol             | Parameter                               | Conditions                                       | Min  | Max  | Unit   |
|--------------------|-----------------------------------------|--------------------------------------------------|------|------|--------|
| V <sub>DS</sub>    | Drain-Source Voltage                    | T <sub>C</sub> = 25 °C                           | -    | -100 | V      |
| V <sub>GS</sub>    | Gate-Source Voltage                     | T <sub>C</sub> = 25 °C                           | -    | ± 20 | V      |
| I <sub>D</sub> *   | Drain Current                           | T <sub>C</sub> = 25 °C, V <sub>GS</sub> = -10 V  | -    | -90  | A      |
|                    |                                         | T <sub>C</sub> = 100 °C, V <sub>GS</sub> = -10 V | -    | -63  | A      |
| I <sub>DM</sub> ** | Pulsed Source Current                   | T <sub>C</sub> = 25 °C, V <sub>GS</sub> = -10 V  | -    | -200 | A      |
| P <sub>tot</sub> * | Total Power Dissipation                 | T <sub>C</sub> = 25 °C                           | -    | 375  | W      |
| T <sub>stg</sub>   | Storage Temperature                     |                                                  | - 55 | 175  | °C     |
| T <sub>J</sub>     | Junction Temperature                    |                                                  | -    | 175  | °C     |
| I <sub>S</sub>     | Diode Forward Current                   | T <sub>C</sub> = 25 °C                           | -    | -90  | A      |
| E <sub>AS</sub> *  | Single Pulsed Avalanche Energy          | V <sub>DD</sub> = -50 V , L= 1 mH                | -    | 684  | mJ     |
| R <sub>θJA</sub> * | Thermal Resistance- Junction to Ambient |                                                  | -    | 60   | °C / W |
| R <sub>θJC</sub> * | Thermal Resistance- Junction to Case    |                                                  | -    | 0.4  |        |

Notes :

- \* Surface Mounted on 1 in<sup>2</sup> pad area, t ≤ 10 sec
- \*\* Pulse width ≤ 300 μs, duty cycle ≤ 2 %
- \*\*\* Limited by bonding wire

## 4. Marking Information

| Product Name | Marking                                                 |
|--------------|---------------------------------------------------------|
| UK180P10LF   | <div>180P10<br/>YWW01<br/>AAAAAA</div> YWW01: Date Code |

## 5. Ordering Code

| Product Name | Package | Reel Size | Tape width | Quantity | Note |
|--------------|---------|-----------|------------|----------|------|
| UK180P10LF   | LFPK5*6 |           |            | -        |      |

## 6. Electrical Characteristics (T<sub>A</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                                                                                 | -100 | -     | -    | V    |
| V <sub>GS(th)</sub>                      | Gate Threshold Voltage         | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>DS</sub> = -250 μA                                                                    | -1   | -     | -2   | V    |
| I <sub>DSS</sub>                         | Drain Leakage Current          | V <sub>DS</sub> = -80 V, V <sub>GS</sub> = 0 V                                                                                   | -    | -     | -1   | μA   |
| I <sub>GSS</sub>                         | Gate Leakage Current           | V <sub>GS</sub> = 0 V, V <sub>GS</sub> = ± 20 V                                                                                  | -    | -     | ±100 | nA   |
| R <sub>DS(ON)</sub> <sup>a</sup>         | On-State Resistance            | V <sub>GS</sub> = -10 V, I <sub>DS</sub> = -30 A                                                                                 | -    | 17    | 19   | mΩ   |
|                                          |                                | V <sub>GS</sub> = -4.5 V, I <sub>DS</sub> = -20 A                                                                                | -    | 18    | 22   |      |
|                                          |                                |                                                                                                                                  |      |       |      |      |
| Diode Characteristics                    |                                |                                                                                                                                  |      |       |      |      |
| V <sub>SD</sub> <sup>a</sup>             | Diode Forward Voltage          | I <sub>SD</sub> = -30 A, V <sub>GS</sub> = 0 V                                                                                   | -    | -     | -1.3 | V    |
| t <sub>rr</sub>                          | Reverse Recovery Time          | I <sub>DS</sub> = -30 A, V <sub>GS</sub> = 0 V<br>dI <sub>SD</sub> /dt = 100 A/μs                                                | -    | 43    | -    | nS   |
| Q <sub>rr</sub>                          | Reverse Recovery Charge        |                                                                                                                                  | -    | 76    | -    | nC   |
| Dynamic Characteristics <sup>b</sup>     |                                |                                                                                                                                  |      |       |      |      |
| C <sub>iss</sub>                         | Input Capacitance              | V <sub>GS</sub> = 0 V, V <sub>DS</sub> = -50 V<br>Frequency = 1 MHz                                                              | -    | 13905 | -    | pF   |
| C <sub>oss</sub>                         | Output Capacitance             |                                                                                                                                  | -    | 301   | -    |      |
| C <sub>rss</sub>                         | Reverse Transfer Capacitance   |                                                                                                                                  | -    | 42    | -    |      |
| t <sub>d(on)</sub>                       | Turn-on Delay Time             | V <sub>DS</sub> = -50 V, V <sub>GEN</sub> = -10 V,<br>R <sub>G</sub> = 3.9 Ω, R <sub>L</sub> = 1.6 Ω,<br>I <sub>DS</sub> = -30 A | -    | 13    | -    | nS   |
| t <sub>r</sub>                           | Turn-on Rise Time              |                                                                                                                                  | -    | 45    | -    |      |
| t <sub>d(off)</sub>                      | Turn-off Delay Time            |                                                                                                                                  | -    | 329   | -    |      |
| t <sub>f</sub>                           | Turn-off Fall Time             |                                                                                                                                  | -    | 95    | -    |      |
| Gate Charge Characteristics <sup>b</sup> |                                |                                                                                                                                  |      |       |      |      |
| Q <sub>g</sub>                           | Total Gate Charge              | V <sub>DS</sub> = -50 V, V <sub>GS</sub> = -10 V,<br>I <sub>DS</sub> = -30 A                                                     | -    | 236   | -    | nC   |
| Q <sub>gs</sub>                          | Gate-Source Charge             |                                                                                                                                  | -    | 55    | -    |      |
| Q <sub>gd</sub>                          | Gate-Drain Charge              |                                                                                                                                  | -    | 27    | -    |      |

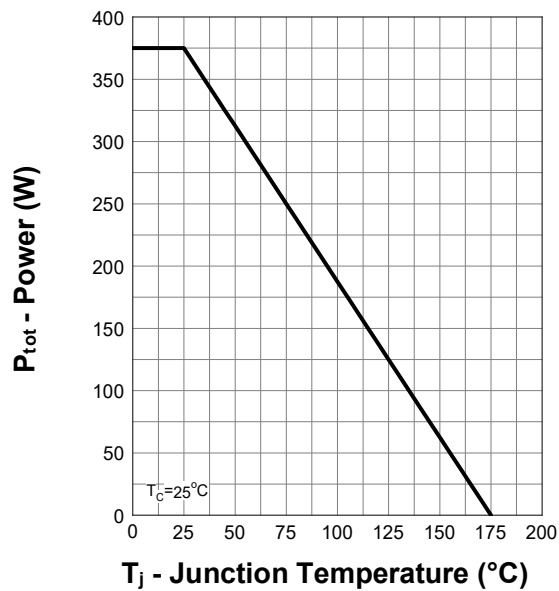
Notes :

a : Pulse test ; pulse width ≤ 300 μs, duty cycle ≤ 2%

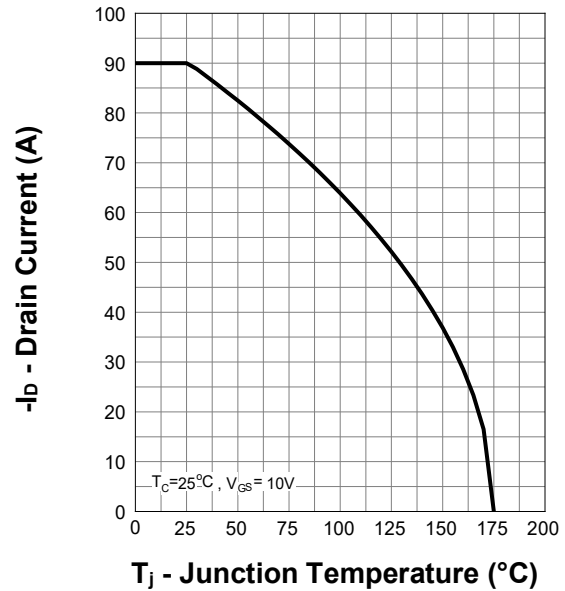
b : Guaranteed by design, not subject to production testing

## 7. Typical Characteristics

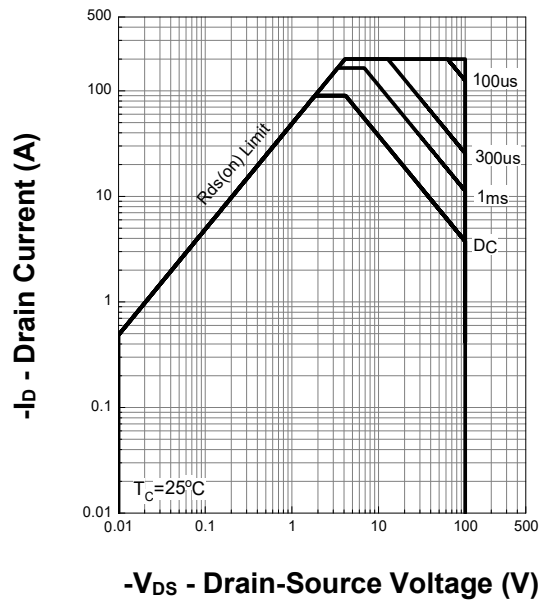
Power Capability



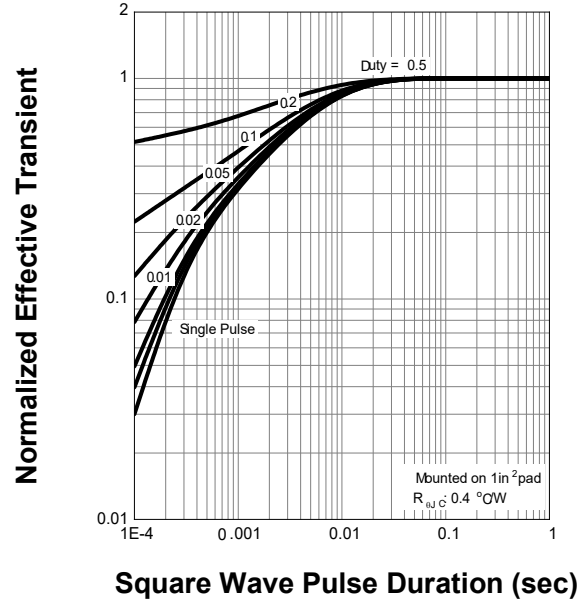
Current Capability



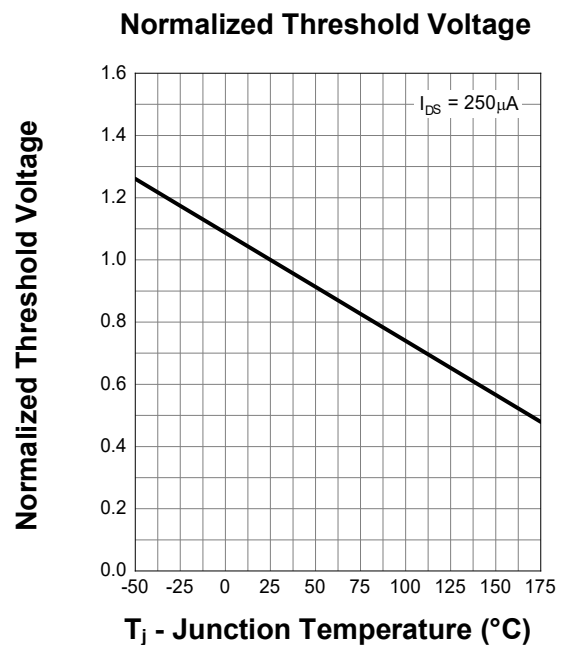
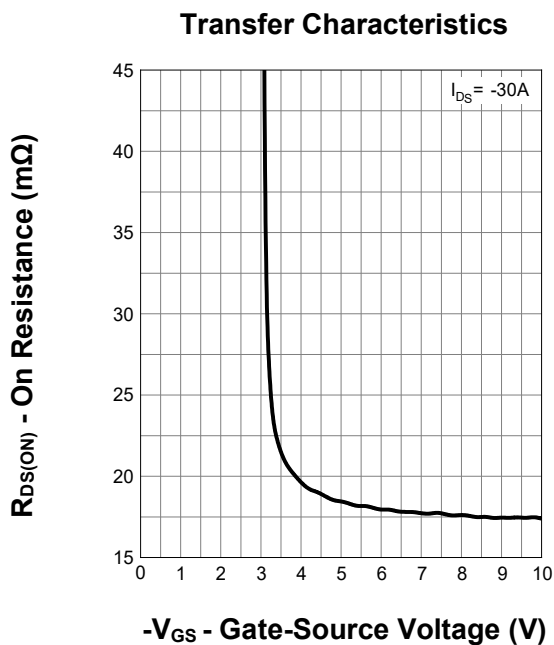
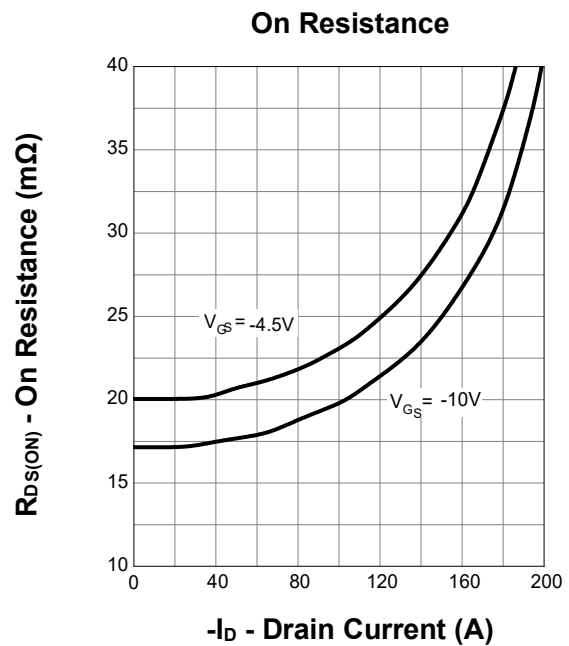
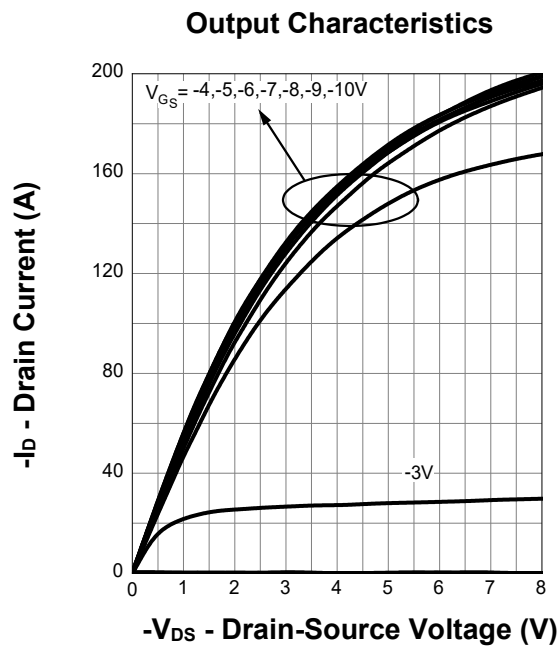
Safe Operating Area



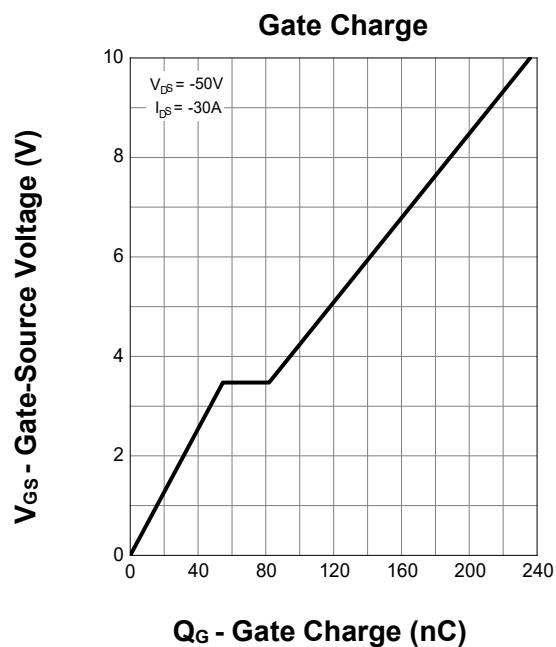
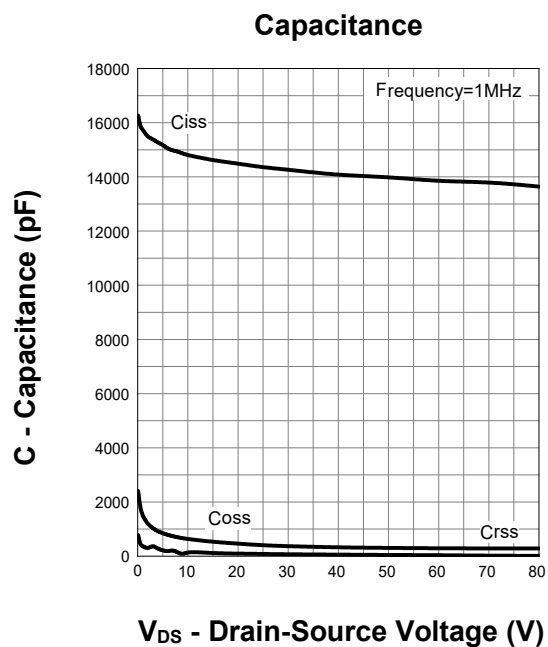
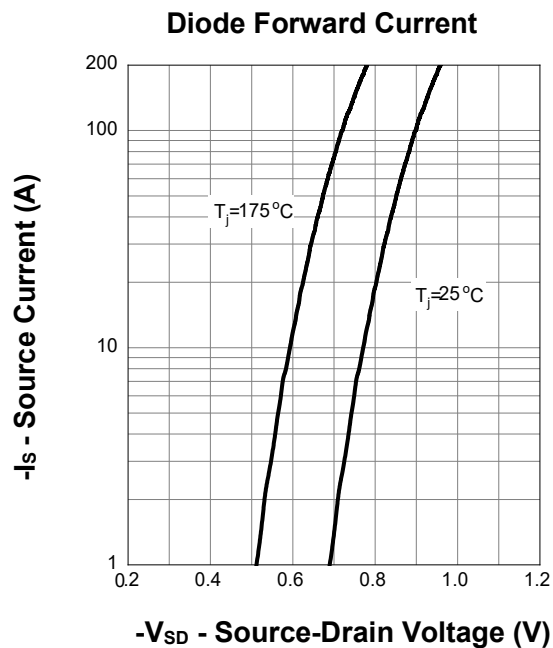
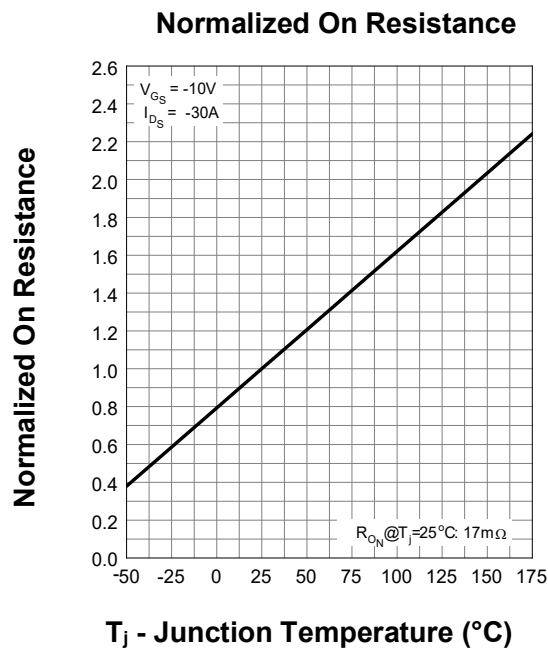
Transient Thermal Impedance



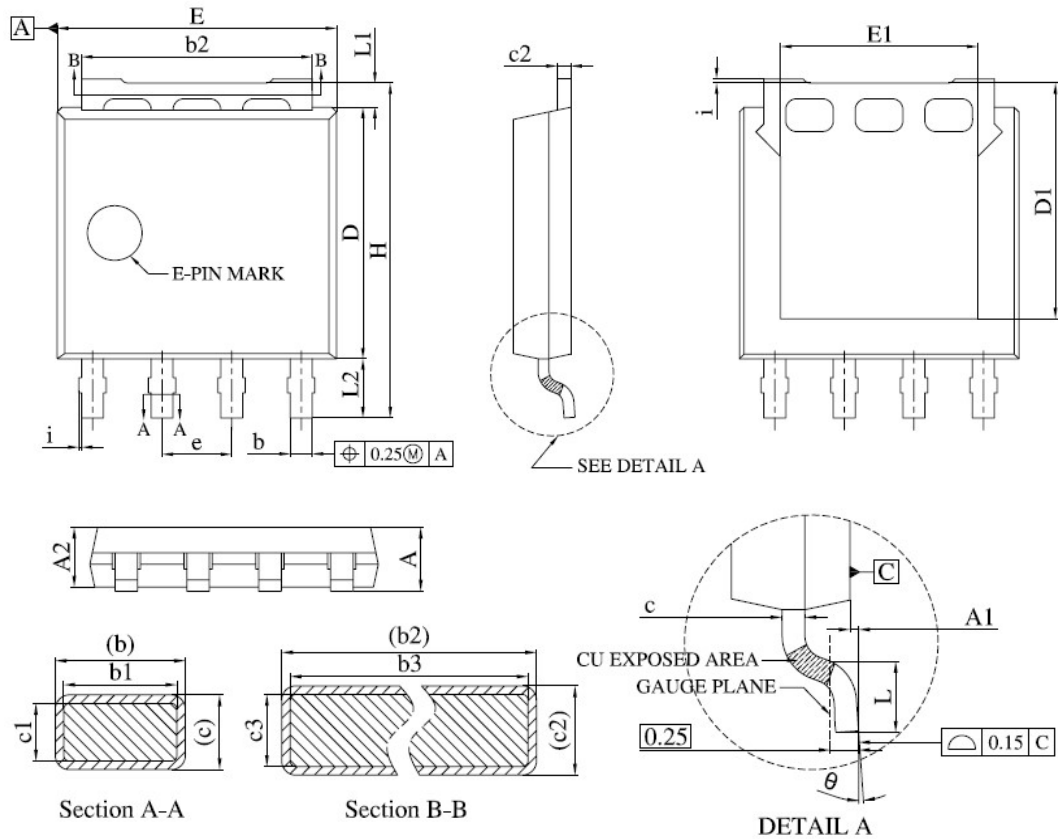
## 7. Typical Characteristics (cont.)



## 7. Typical Characteristics (cont.)



## 8. Package Dimensions LFPAK5\*6 Package



| Symbol | Dimensions In Millimeters |      |
|--------|---------------------------|------|
|        | MIN.                      | MAX. |
| A      | 1.00                      | 1.30 |
| A1     | 0.00                      | 0.15 |
| A2     | 0.98                      | 1.12 |
| b      | 0.35                      | 0.50 |
| b1     | 0.32                      | 0.46 |
| b2     | 4.02                      | 4.41 |
| b3     | 4.00                      | 4.37 |
| c      | 0.19                      | 0.25 |
| c1     | 0.17                      | 0.23 |
| c2     | 0.24                      | 0.30 |
| c3     | 0.22                      | 0.28 |
| D      | 4.45                      | 4.70 |
| D1     | -                         | 4.45 |
| E      | 4.95                      | 5.30 |
| E1     | 3.50                      | 3.70 |
| e      | 1.27 BSC.                 |      |

| Symbol | Dimensions In Millimeters |      |
|--------|---------------------------|------|
|        | MIN.                      | MAX. |
| H      | 5.95                      | 6.25 |
| i      | -                         | 0.25 |
| L      | 0.40                      | 0.85 |
| L1     | 0.27                      | 0.57 |
| L2     | 0.80                      | 1.30 |
| θ      | 0°                        | 8°   |