

SuperMOS–PDFN5\*6-8L 30V  $BV_{DSS}$ , 1.15m $\Omega$   $R_{DS(on)}$ , N-channel MOSFET

## 1. Description

The AON6512-ES is N-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product AON6512-ES is Pb-free.

## 2. Features

- 30V,  $R_{DS(ON)}=1.15m\Omega$ (TYP.) @ $V_{GS}=10V$   
 $R_{DS(ON)}=1.5m\Omega$ (TYP.) @ $V_{GS}=4.5V$
- Use trench MOSFET technology
- High density cell design for low  $R_{DS(on)}$
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

## 3. Applications

- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

100% UIS TESTED

## 4. Ordering Information

| Part Number | Package    | Marking     | Material     | Packing     | Quantity per reel | Flammability Rating | Reel Size |
|-------------|------------|-------------|--------------|-------------|-------------------|---------------------|-----------|
| AON6512-ES  | PDFN5*6-8L | ESN6512/lot | Halogen free | Tape & Reel | 5,000 PCS         | UL 94V-0            | 13 inches |

Table-1 Ordering information

## 5. Pin Configuration and Functions

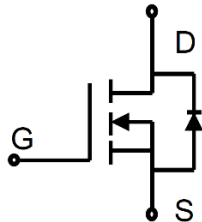
| Pin     | Function | Outline                                                                                       | Circuit Diagram                                                                       |
|---------|----------|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 4       | Gate     | Note b<br> |  |
| 1/2/3   | Source   |                                                                                               |                                                                                       |
| 5/6/7/8 | Drain    |                                                                                               |                                                                                       |

Table-2 Pin configuration

## 6. Specification

### Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 °C ambient temperature unless otherwise specified.

| Parameter                         |                           | Symbol     | Limit      | Unit               |
|-----------------------------------|---------------------------|------------|------------|--------------------|
| Drain-Source Voltage              |                           | $BV_{DSS}$ | 30         | V                  |
| Gate-Source Voltage               |                           | $V_{GS}$   | $\pm 20$   | V                  |
| Continuous Drain Current          | $T_C=25^{\circ}\text{C}$  | $I_D$      | 120        | A                  |
|                                   | $T_C=100^{\circ}\text{C}$ |            | 78         |                    |
| Maximum Power Dissipation         | $T_C=25^{\circ}\text{C}$  | $P_D$      | 120        | W                  |
|                                   | $T_C=100^{\circ}\text{C}$ |            | 48         |                    |
| Pulsed Drain Current <sup>a</sup> |                           | $I_{DM}$   | 480        | A                  |
| Avalanche Current (L=0.5mH)       |                           | $I_{AS}$   | 43         | A                  |
| Avalanche energy                  |                           | $E_{AS}$   | 462        | mJ                 |
| Operating Junction Temperature    |                           | $T_J$      | 150        | $^{\circ}\text{C}$ |
| Lead Temperature                  |                           | $T_L$      | 260        | $^{\circ}\text{C}$ |
| Storage Temperature Range         |                           | $T_{stg}$  | -55 to 150 | $^{\circ}\text{C}$ |

### Thermal resistance ratings

| Single Operation                                 |                 |         |                      |
|--------------------------------------------------|-----------------|---------|----------------------|
| Parameter                                        | Symbol          | Typical | Unit                 |
| Junction-to-Case Thermal Resistance <sup>a</sup> | $R_{\theta JC}$ | 1.04    | $^{\circ}\text{C/W}$ |

Note:

a: Surface mounted on FR4 Board using 1 square inch pad size, 1oz copper

b: This diagram is only an electrical schematic, and the actual pin size is based on POD.

## Electrical Characteristics

At TA = 25°C unless otherwise specified

| Parameter                                 | Symbol              | Test Conditions                                                                        | Min. | Typ. | Max. | Unit |
|-------------------------------------------|---------------------|----------------------------------------------------------------------------------------|------|------|------|------|
| OFF CHARACTERISTICS                       |                     |                                                                                        |      |      |      |      |
| Drain-to-Source Breakdown Voltage         | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA                                             | 30   |      |      | V    |
| Zero Gate Voltage Drain Current           | I <sub>DSS</sub>    | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V                                              |      |      | 1.0  | uA   |
| Gate-to-source Leakage Current            | I <sub>GSS</sub>    | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                                             |      |      | ±100 | nA   |
| ON CHARACTERISTICS                        |                     |                                                                                        |      |      |      |      |
| Gate Threshold Voltage                    | V <sub>GS(TH)</sub> | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA                               | 1.2  | 1.5  | 2.0  | V    |
| Drain-to-source On-resistance             | R <sub>DS(on)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =20A                                              |      | 1.15 | 1.5  | mΩ   |
|                                           |                     | V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A                                             |      | 1.5  | 2.2  | mΩ   |
| Forward Trans conductance                 | g <sub>FS</sub>     | V <sub>DS</sub> =5.0V, I <sub>D</sub> =20A                                             |      |      | 150  | S    |
| CHARGES, CAPACITANCES AND GATE RESISTANCE |                     |                                                                                        |      |      |      |      |
| Input Capacitance                         | C <sub>ISS</sub>    | V <sub>GS</sub> =0V, f=1MHz,<br>V <sub>DS</sub> =15V                                   |      | 4050 |      | pF   |
| Output Capacitance                        | C <sub>OSS</sub>    |                                                                                        |      | 1710 |      |      |
| Reverse Transfer Capacitance              | C <sub>RSS</sub>    |                                                                                        |      | 140  |      |      |
| Total Gate Charge                         | Q <sub>G(TOT)</sub> | V <sub>GS</sub> =10V, V <sub>DS</sub> =10V,<br>I <sub>D</sub> =30A                     |      | 68   |      | nC   |
| Gate-to-Source Charge                     | Q <sub>GS</sub>     |                                                                                        |      | 12   |      |      |
| Gate-to-Drain Charge                      | Q <sub>GD</sub>     |                                                                                        |      | 17   |      |      |
| SWITCHING CHARACTERISTICS                 |                     |                                                                                        |      |      |      |      |
| Turn-On Delay Time                        | t <sub>d(ON)</sub>  | V <sub>GS</sub> =10V, V <sub>DS</sub> =15V,<br>I <sub>D</sub> =50A, R <sub>G</sub> =1Ω |      | 18   |      | ns   |
| Rise Time                                 | t <sub>r</sub>      |                                                                                        |      | 11   |      |      |
| Turn-Off Delay Time                       | t <sub>d(OFF)</sub> |                                                                                        |      | 64   |      |      |
| Fall Time                                 | t <sub>f</sub>      |                                                                                        |      | 11   |      |      |
| BODY DIODE CHARACTERISTICS                |                     |                                                                                        |      |      |      |      |
| Forward Voltage                           | V <sub>SD</sub>     | V <sub>GS</sub> =0V, I <sub>S</sub> =20A                                               | 0.45 |      | 1.2  | V    |

7. Typical Characteristic

Figure 1. On-Region Characteristics

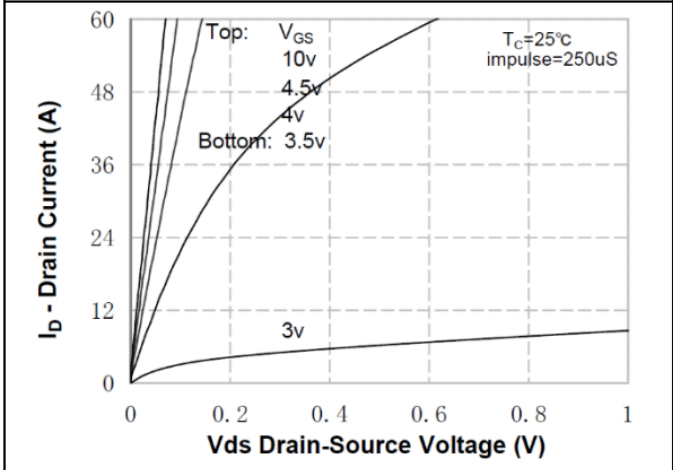


Figure 2. Transfer Characteristics

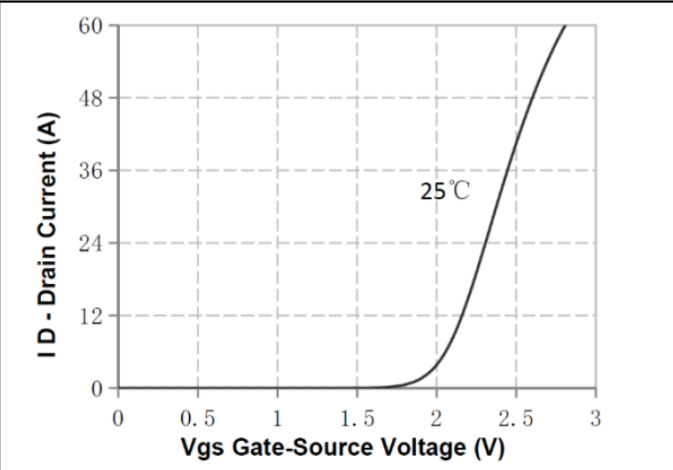


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

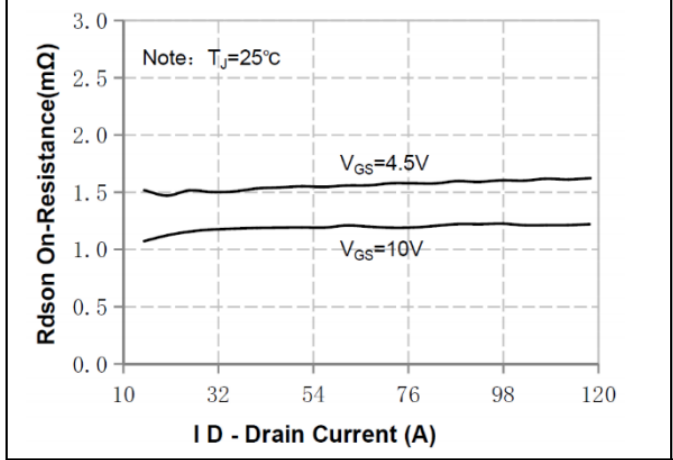


Figure 4. On-Resistance Variation vs Gate Voltage

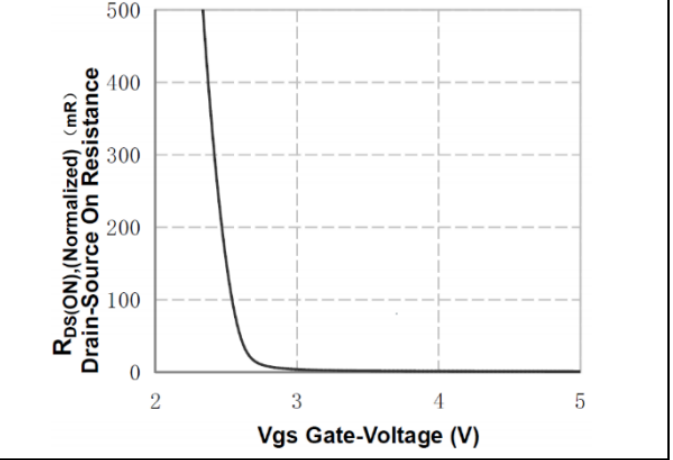


Figure 5. Capacitance Characteristics

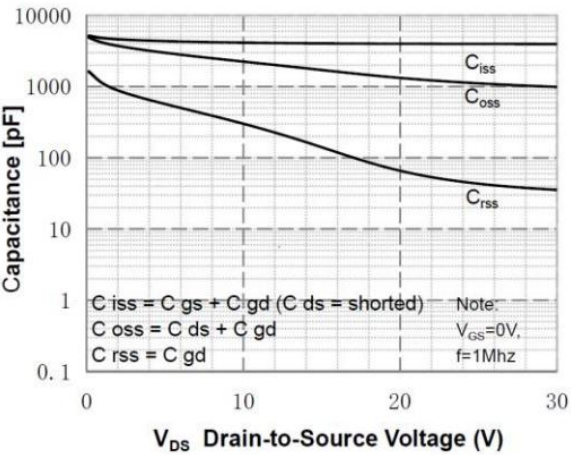


Figure 6. Body-Diode Forward Voltage Variation with Source Current and Temperature

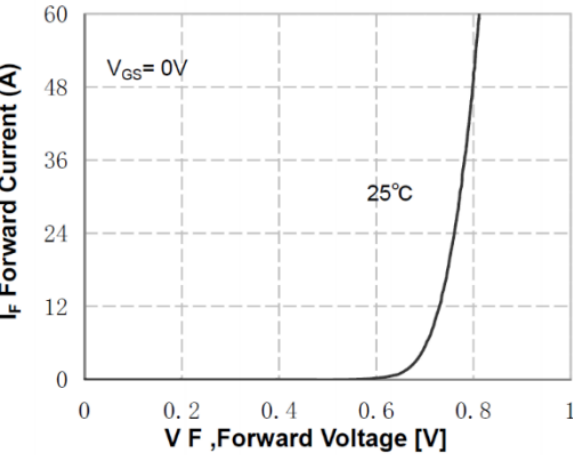
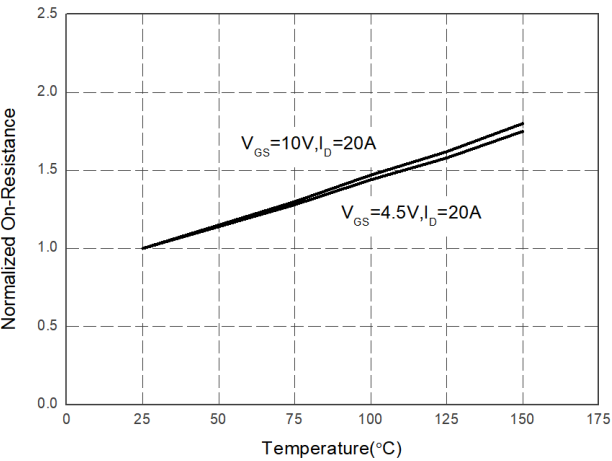
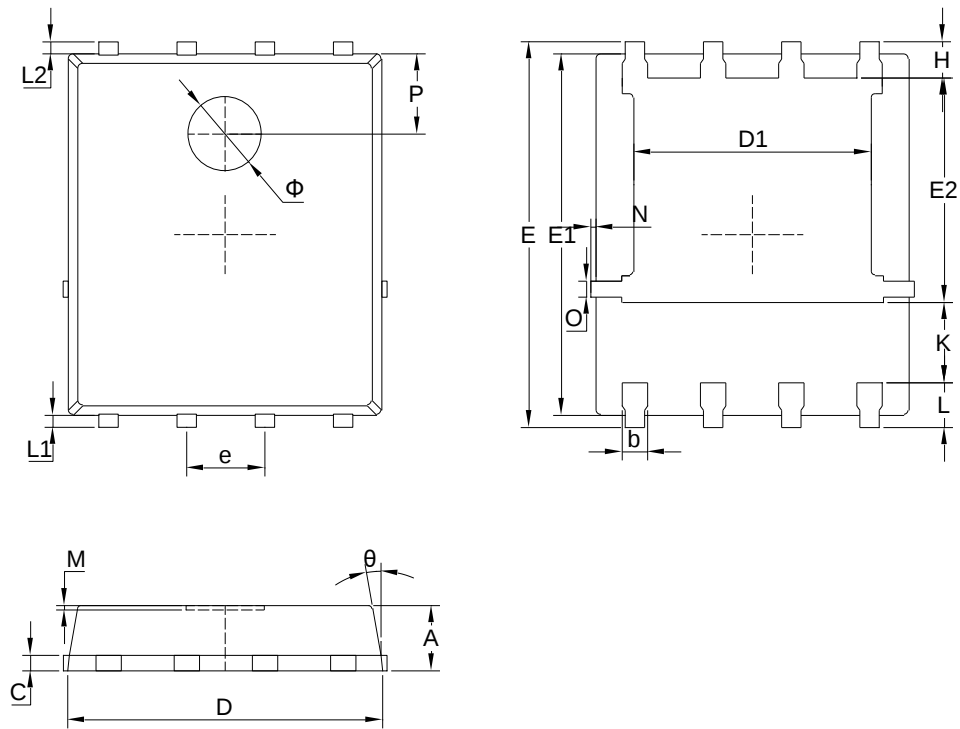


Figure 7. On-Resistance vs. Junction Temperature



8. Dimension (PDFN5\*6-8L)

POD A(J)

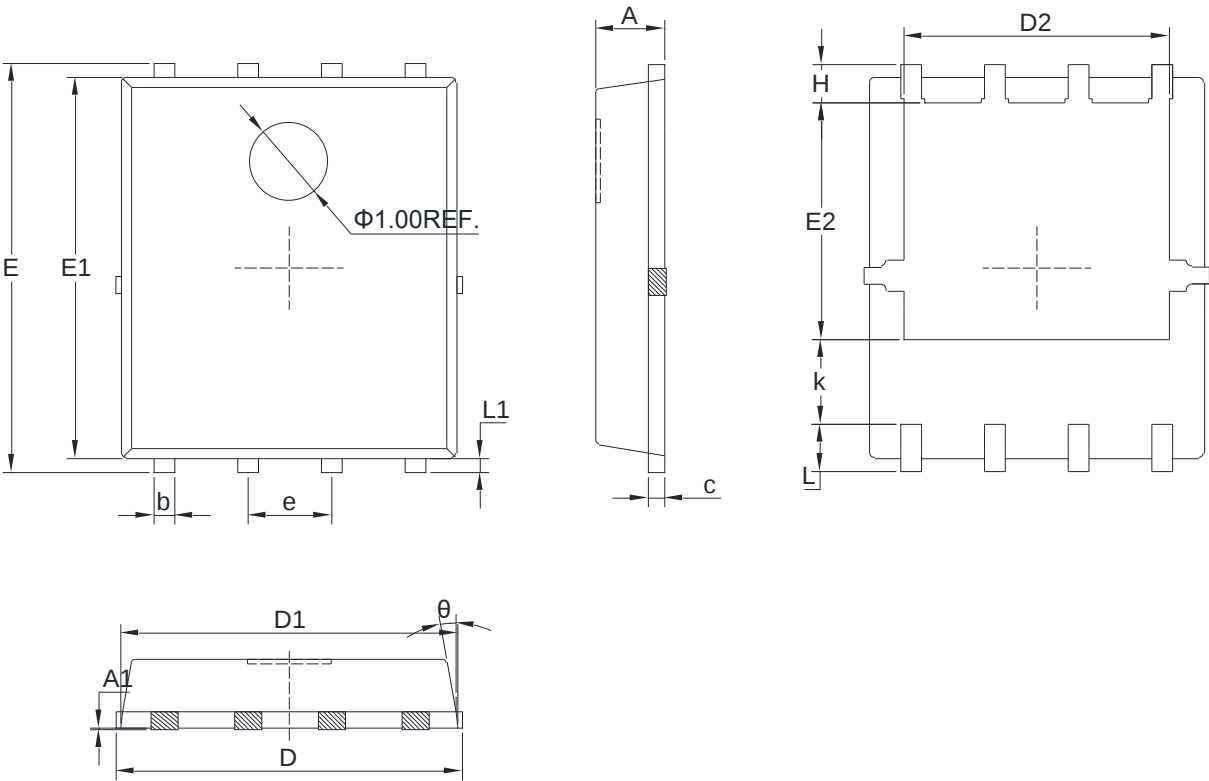


| Symbol | Dimensions in Millimeters |      |      | Symbol | Dimensions in Millimeters |      |      |
|--------|---------------------------|------|------|--------|---------------------------|------|------|
|        | MIN                       | NOM  | MAX  |        | MIN                       | NOM  | MAX  |
| A      | 0.90                      | 1.05 | 1.20 | H      | 0.48                      | 0.58 | 0.68 |
| b      | 0.35                      | 0.40 | 0.50 | K      | 1.17                      | 1.27 | 1.37 |
| C      | 0.20                      | 0.25 | 0.35 | L      | 0.64                      | 0.74 | 0.84 |
| D      | 4.90                      | 5.05 | 5.20 | L1/L2  | 0.20 REF.                 |      |      |
| D1     | 3.72                      | 3.82 | 3.92 | θ      | 8°                        | 10°  | 12°  |
| E      | 6.00                      | 6.15 | 6.30 | M      | 0.08 REF.                 |      |      |
| E1     | 5.60                      | 5.75 | 5.90 | N      | 0                         | -    | 0.15 |
| E2     | 3.47                      | 3.57 | 3.67 | O      | 0.25 REF.                 |      |      |
| e      | 1.27 BSC.                 |      |      | P      | 1.28 REF.                 |      |      |
| Φ      | 1.20 REF                  |      |      |        |                           |      |      |

**AON6512-ES**

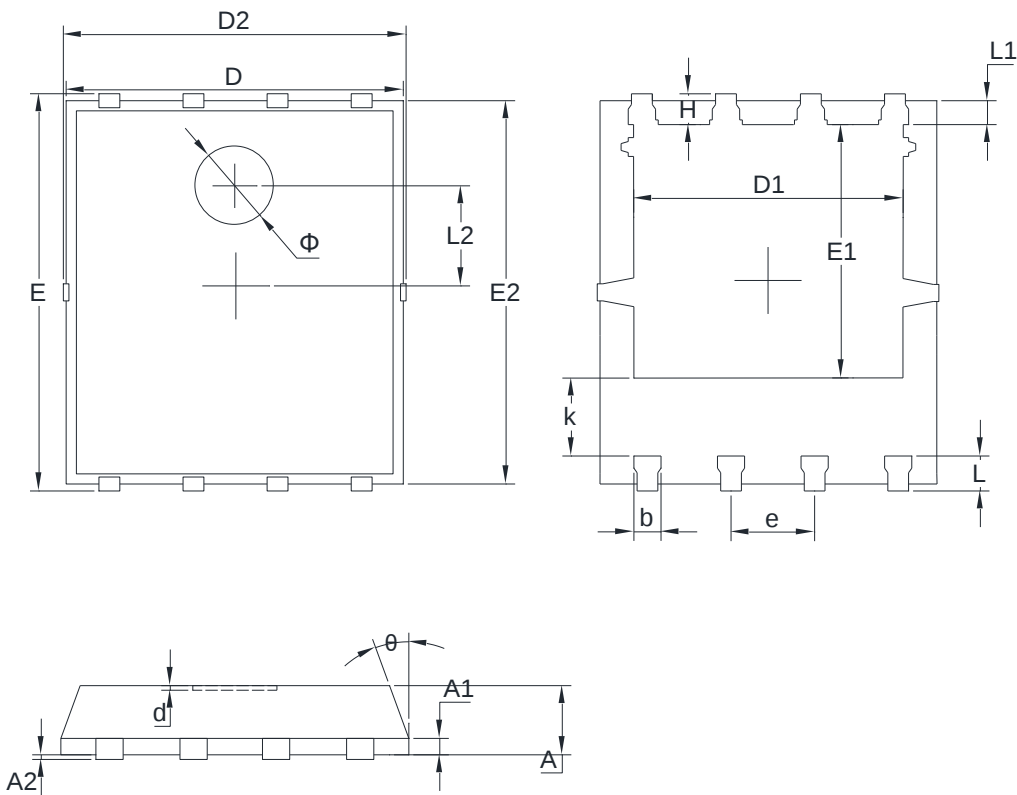
Rev-1.5

**POD B(Q)**



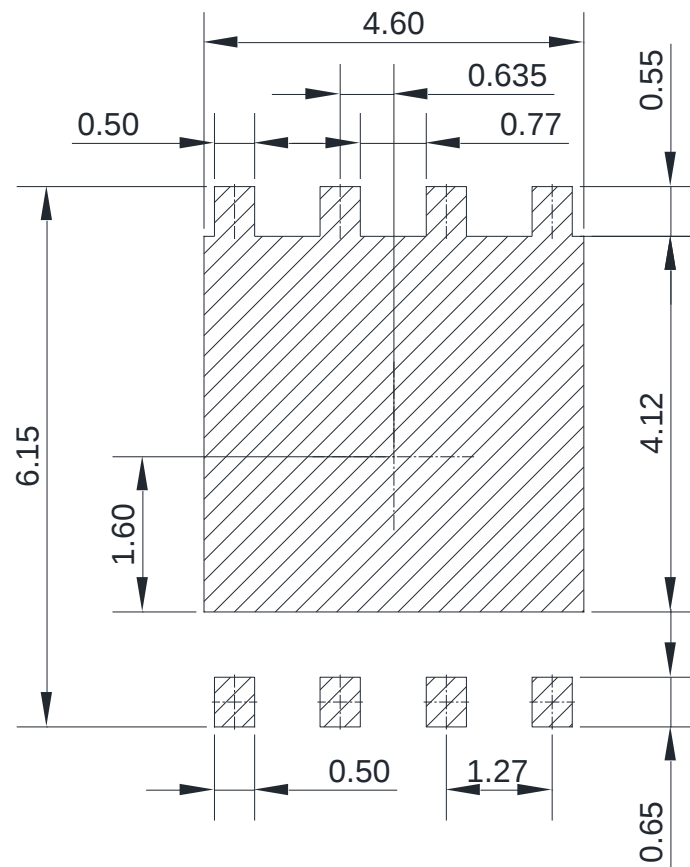
| Symbol | Dimensions in Millimeters |      |      | Symbol   | Dimensions in Millimeters |      |      |
|--------|---------------------------|------|------|----------|---------------------------|------|------|
|        | MIN                       | NOM  | MAX  |          | MIN                       | NOM  | MAX  |
| A      | 0.90                      | 1.00 | 1.10 | H        | 0.46                      | 0.56 | 0.66 |
| A1     |                           |      | 0.05 | k        | 1.10                      |      |      |
| b      | 0.30                      | 0.40 | 0.50 | L        | 0.51                      | 0.61 | 0.71 |
| c      | 0.20                      | 0.25 | 0.30 | L1       | 0.05                      | 0.15 | 0.25 |
| D      | 4.80                      | 5.10 | 5.40 | $\theta$ | 8°                        | 10°  | 12°  |
| D2     | 3.75                      | 3.90 | 4.05 | D1       | 4.80                      | 4.90 | 5.00 |
| E      | 5.95                      | 6.05 | 6.15 |          |                           |      |      |
| E1     | 5.65                      | 5.75 | 5.85 |          |                           |      |      |
| e      | 1.27BCS                   |      |      |          |                           |      |      |
| E2     | 3.34                      | 3.49 | 3.64 |          |                           |      |      |

POD C(X)



| Symbol | Dimensions in Millimeters |       |       | Symbol | Dimensions in Millimeters |       |       |
|--------|---------------------------|-------|-------|--------|---------------------------|-------|-------|
|        | MIN                       | NOM   | MAX   |        | MIN                       | NOM   | MAX   |
| A      | 0.900                     | 1.000 | 1.100 | H      | 0.549                     | 0.625 | 0.701 |
| A1     | 0.254 REF                 |       |       | k      | 1.190                     | 1.290 | 1.390 |
| A2     | 0.000                     |       | 0.050 | L      | 0.534                     | 0.610 | 0.686 |
| D      | 4.824                     | 4.900 | 4.976 | L1     | 0.424                     | 0.500 | 0.576 |
| D1     | 3.910                     | 4.010 | 4.110 | θ      | 8°                        | 10°   | 12°   |
| D2     | 4.924                     | 5.000 | 5.076 | L2     | 1.800 REF                 |       |       |
| E      | 5.924                     | 6.000 | 6.076 | Φ      | 1.100                     | 1.200 | 1.300 |
| E1     | 3.375                     | 3.475 | 3.575 | d      |                           |       | 0.100 |
| e      | 1.270 TYP                 |       |       | b      | 0.350                     | 0.400 | 0.450 |
| E2     | 5.674                     | 5.750 | 5.826 |        |                           |       |       |

## 9. Recommended Soldering Footprint



DIMENSIONS: MILLIMETERS

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