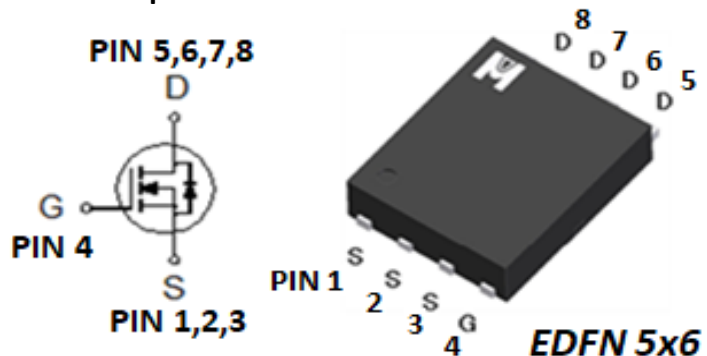


Single N-Channel Logic Level Enhancement Mode Field Effect Transistor

•Product Summary:

|                                |        |
|--------------------------------|--------|
|                                | N-CH   |
| BVDSS                          | 100V   |
| $R_{DS(on)}(MAX.)@V_{GS}=10V$  | 7.5mΩ  |
| $R_{DS(on)}(MAX.)@V_{GS}=4.5V$ | 10.0mΩ |
| $I_D @T_C=25^{\circ}C$         | 107.0A |
| $I_D @T_A=25^{\circ}C$         | 14.0A  |

• Pin Description:



Single N Channel MOSFET

UIS, Rg 100% Tested

RoHS & Halogen Free & TSCA Compliant



•ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^{\circ}C$  Unless Otherwise Noted)

| PARAMETERS/TEST CONDITIONS                     |                      | SYMBOL         | LIMITS     | UNIT        |
|------------------------------------------------|----------------------|----------------|------------|-------------|
| Gate-Source Voltage                            |                      | $V_{GS}$       | $\pm 20$   | V           |
| Continuous Drain Current                       | $T_C = 25^{\circ}C$  | $I_D$          | 107        | A           |
|                                                | $T_C = 100^{\circ}C$ |                | 68         |             |
| Continuous Drain Current                       | $T_A = 25^{\circ}C$  | $I_D$          | 14         |             |
|                                                | $T_A = 70^{\circ}C$  |                | 11         |             |
| Pulsed Drain Current <sup>1</sup>              |                      | $I_{DM}$       | 169        |             |
| Avalanche Current                              |                      | $I_{AS}$       | 30         | mJ          |
| Avalanche Energy                               | $L = 0.1mH$          | EAS            | 45.0       |             |
| Repetitive Avalanche Energy <sup>2</sup>       | $L = 0.05mH$         | EAR            | 22.5       |             |
| Power Dissipation                              | $T_C = 25^{\circ}C$  | $P_D$          | 138.9      | W           |
|                                                | $T_C = 100^{\circ}C$ |                | 55.6       |             |
| Power Dissipation                              | $T_A = 25^{\circ}C$  | $P_D$          | 2.5        | W           |
|                                                | $T_A = 70^{\circ}C$  |                | 1.6        |             |
| Operating Junction & Storage Temperature Range |                      | $T_J, T_{stg}$ | -55 to 150 | $^{\circ}C$ |

• 100% UIS testing in condition of  $V_D=50V$ ,  $L=0.1mH$ ,  $V_G=10V$ ,  $I_L=18A$ , Rated  $V_{DS}=100V$  N-CH

•THERMAL RESISTANCE RATINGS

| THERMAL RESISTANCE               | SYMBOL          | TYPICAL | MAXIMUM | UNIT          |
|----------------------------------|-----------------|---------|---------|---------------|
| Junction-to-Case                 | $R_{\theta JC}$ |         | 0.9     | $^{\circ}C/W$ |
| Junction-to-Ambient <sup>3</sup> | $R_{\theta JA}$ |         | 50      |               |

<sup>1</sup>Pulse width limited by maximum junction temperature.

<sup>2</sup>Duty cycle  $< 1\%$

<sup>3</sup>The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^{\circ}C$ .

<sup>4</sup>Guarantee by Engineering test



▪ ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25 °C, Unless Otherwise Noted)

| PARAMETER                                       | SYMBOL                                 | TEST CONDITIONS                                                                            | LIMITS |      |      | UNIT |
|-------------------------------------------------|----------------------------------------|--------------------------------------------------------------------------------------------|--------|------|------|------|
|                                                 |                                        |                                                                                            | MIN    | TYP  | MAX  |      |
| STATIC                                          |                                        |                                                                                            |        |      |      |      |
| Drain-Source Breakdown Voltage <sup>4</sup>     | V <sub>(BR)DSS</sub>                   | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250uA                                               | 100    |      |      | V    |
| Gate Threshold Voltage <sup>4</sup>             | V <sub>GS(th)</sub>                    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250uA                                 | 1.5    | 2    | 2.5  |      |
| Gate-Body Leakage <sup>4</sup>                  | I <sub>GSS</sub>                       | V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V                                               |        |      | ±100 | nA   |
| Zero Gate Voltage Drain Current <sup>4</sup>    | I <sub>DSS</sub>                       | V <sub>DS</sub> =80V, V <sub>GS</sub> = 0V                                                 |        |      | 1    | uA   |
|                                                 |                                        | V <sub>DS</sub> =70V, V <sub>GS</sub> =0V, T <sub>J</sub> = 125°C                          |        |      | 25   |      |
| On-State Drain Current <sup>1</sup>             | I <sub>D(ON)</sub>                     | V <sub>DS</sub> = 5V, V <sub>GS</sub> = 10V                                                | 107    |      |      | A    |
| Drain-Source On-State Resistance <sup>1,4</sup> | R <sub>DS(ON)</sub>                    | V <sub>GS</sub> = 10V, I <sub>D</sub> = 24A                                                |        | 6.2  | 7.5  | mΩ   |
|                                                 |                                        | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 20A                                               |        | 7.6  | 10   |      |
| Forward Transconductance <sup>1</sup>           | g <sub>fs</sub>                        | V <sub>DS</sub> = 5V, I <sub>D</sub> = 24A                                                 |        | 70   |      | S    |
| DYNAMIC                                         |                                        |                                                                                            |        |      |      |      |
| Input Capacitance <sup>5</sup>                  | C <sub>iss</sub>                       | V <sub>GS</sub> = 0V, V <sub>DS</sub> = 50V, f = 1MHz                                      |        | 2852 |      | pF   |
| Output Capacitance <sup>5</sup>                 | C <sub>oss</sub>                       |                                                                                            |        | 500  |      |      |
| Reverse Transfer Capacitance <sup>5</sup>       | C <sub>rss</sub>                       |                                                                                            |        | 30   |      |      |
| Gate Resistance <sup>4,5</sup>                  | R <sub>g</sub>                         | f = 1MHz                                                                                   |        | 1.0  |      | Ω    |
| Total Gate Charge <sup>1,2,5</sup>              | Q <sub>g</sub> (V <sub>GS</sub> =10V)  | V <sub>DS</sub> = 50V, V <sub>GS</sub> = 10V,<br>I <sub>D</sub> = 24A                      |        | 40.5 |      | nC   |
|                                                 | Q <sub>g</sub> (V <sub>GS</sub> =4.5V) |                                                                                            |        | 21.2 |      |      |
| Gate-Source Charge <sup>1,2,5</sup>             | Q <sub>gs</sub>                        |                                                                                            |        | 7.7  |      |      |
| Gate-Drain Charge <sup>1,2,5</sup>              | Q <sub>gd</sub>                        |                                                                                            |        | 7.6  |      |      |
| Turn-On Delay Time <sup>1,2,5</sup>             | t <sub>d(on)</sub>                     | V <sub>DS</sub> = 50V, V <sub>GS</sub> = 10V,<br>I <sub>D</sub> = 5A , R <sub>g</sub> = 6Ω |        | 12.0 |      | nS   |
| Rise Time <sup>1,2,5</sup>                      | t <sub>r</sub>                         |                                                                                            |        | 11.4 |      |      |
| Turn-Off Delay Time <sup>1,2,5</sup>            | t <sub>d(off)</sub>                    |                                                                                            |        | 44.3 |      |      |
| Fall Time <sup>1,2,5</sup>                      | t <sub>f</sub>                         |                                                                                            |        | 37.8 |      |      |
| SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS  |                                        |                                                                                            |        |      |      |      |
| Continuous Current                              | I <sub>S</sub>                         |                                                                                            |        |      | 107  | A    |
| Pulsed Current <sup>3</sup>                     | I <sub>SM</sub>                        |                                                                                            |        |      | 169  |      |
| Forward Voltage <sup>1,4</sup>                  | V <sub>SD</sub>                        | I <sub>F</sub> = 24A, V <sub>GS</sub> = 0V                                                 |        |      | 1.2  | V    |
| Reverse Recovery Time <sup>5</sup>              | t <sub>rr</sub>                        | I <sub>F</sub> = 24A, dI <sub>F</sub> /dt = 100A / uS                                      |        | 49.5 |      | nS   |
| Peak Reverse Recovery Current <sup>5</sup>      | I <sub>RM(REC)</sub>                   |                                                                                            |        | 2.11 |      | A    |
| Reverse Recovery Charge <sup>5</sup>            | Q <sub>rr</sub>                        |                                                                                            |        | 57.9 |      | nC   |

<sup>1</sup>Pulse test : Pulse Width ≤ 300 usec, Duty Cycle ≤ 2%.

<sup>2</sup>Independent of operating temperature.

<sup>3</sup>Pulse width limited by maximum junction temperature.

<sup>4</sup>Guarantee by FT test Item

<sup>5</sup>Guarantee by Engineering test

EMC will review datasheet by quarter, and update new version.



▪ TYPICAL CHARACTERISTICS

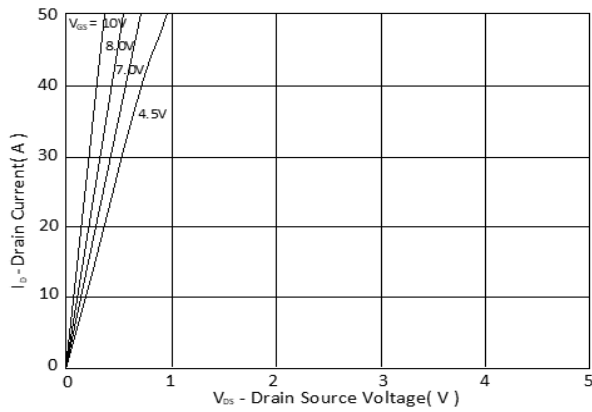


Fig.1 Typical Output Characteristics

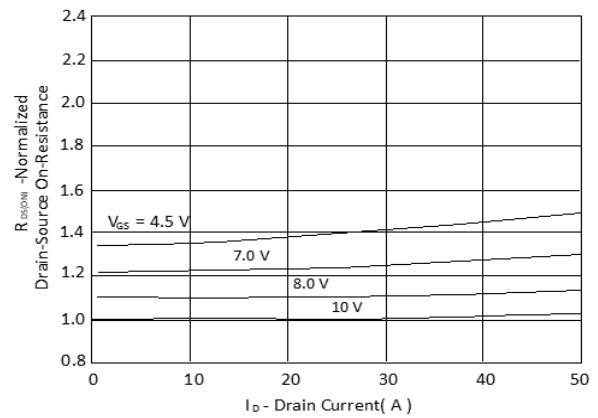


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

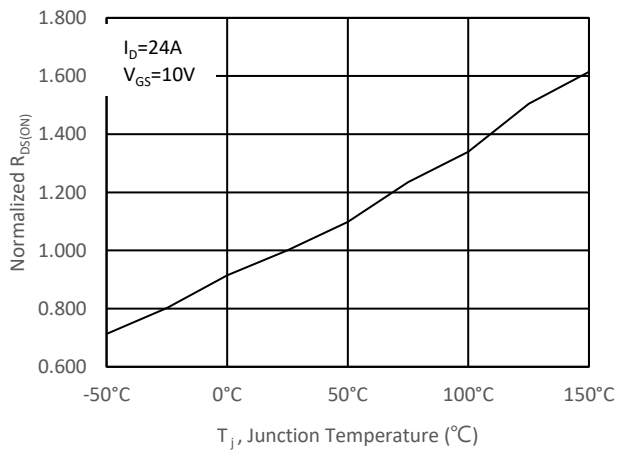


Fig.3 Normalized On-Resistance v.s. Junction Temperature

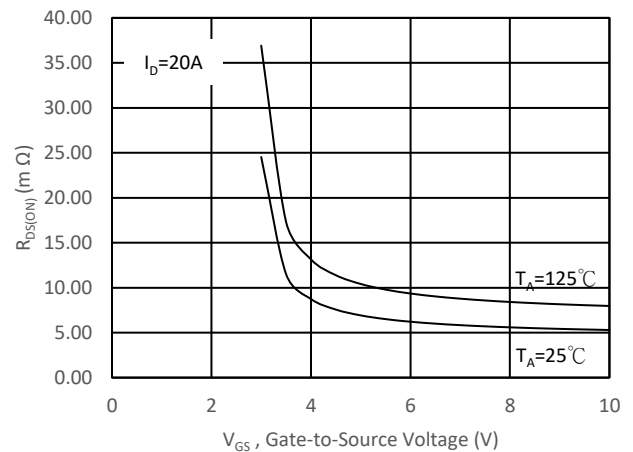


Fig.4 On-Resistance v.s. Gate Voltage

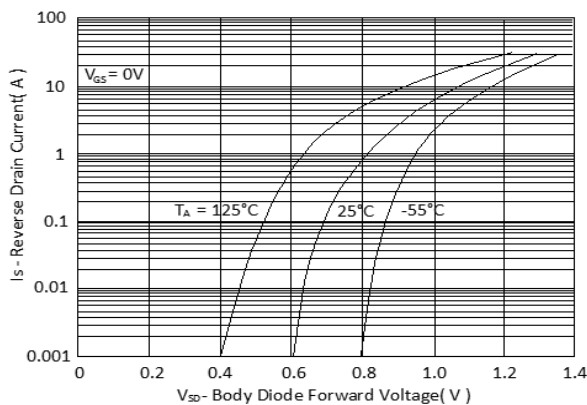


Fig.5 Forward Characteristic of Reverse Diode

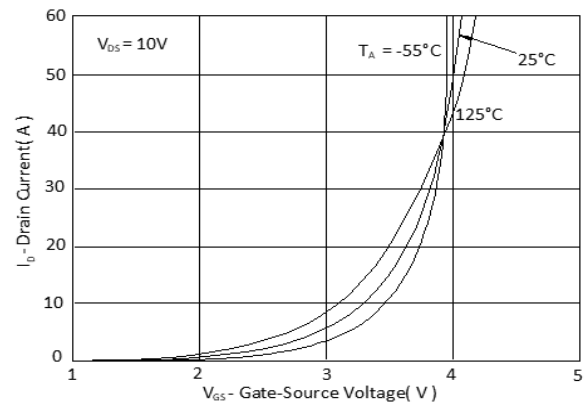
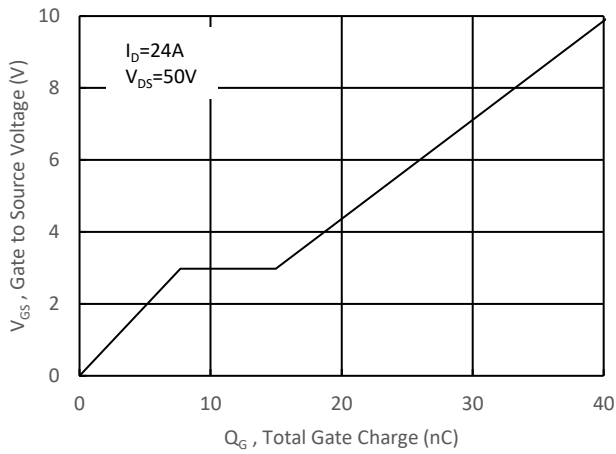
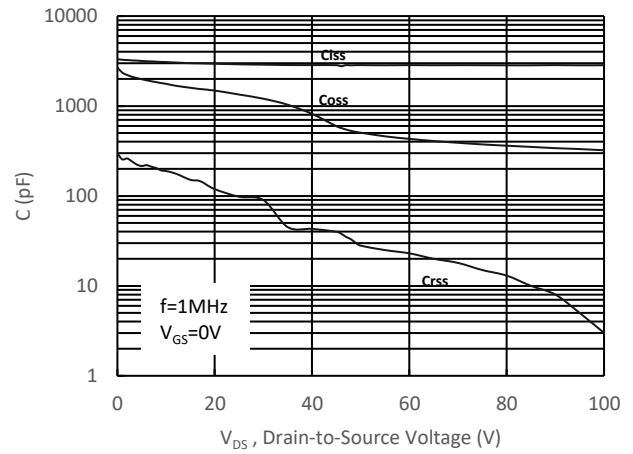


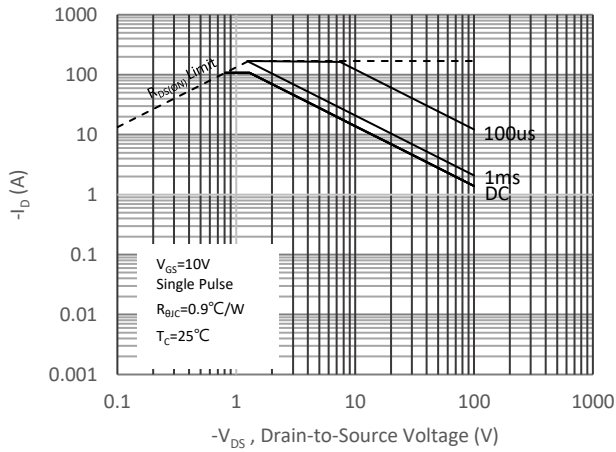
Fig.6 Transfer Characteristics



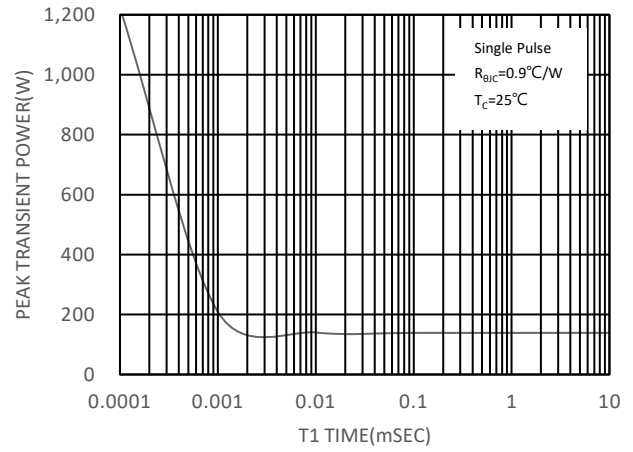
**Fig.7 Gate Charge Characteristics**



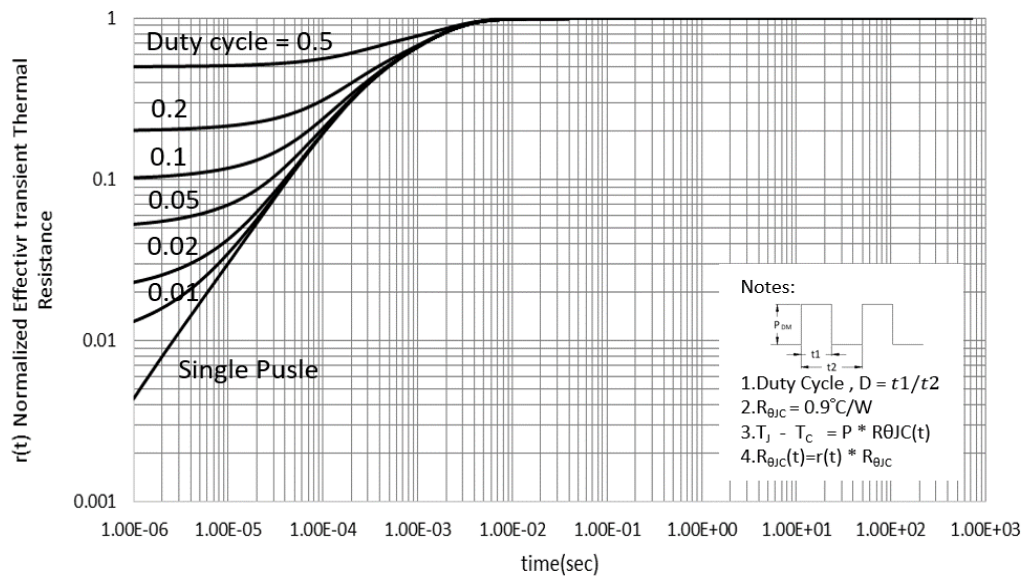
**Fig.8 Typical Capacitance Characteristics**



**Fig.9. Maximum Safe Operating Area**



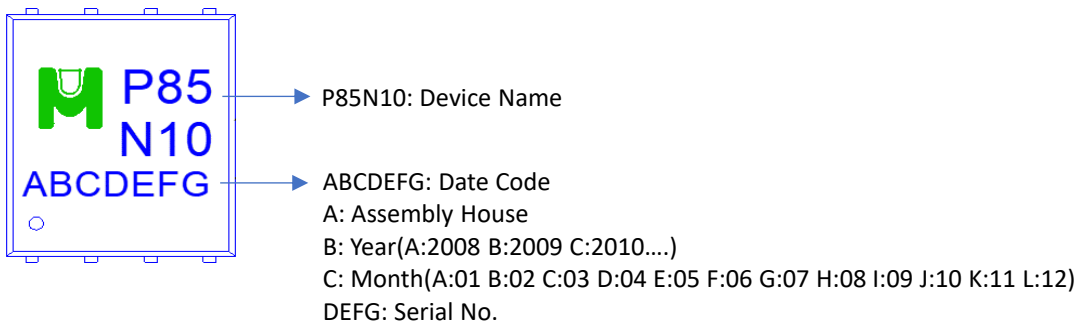
**Fig.10. Single Pulse Maximum Power Dissipation**



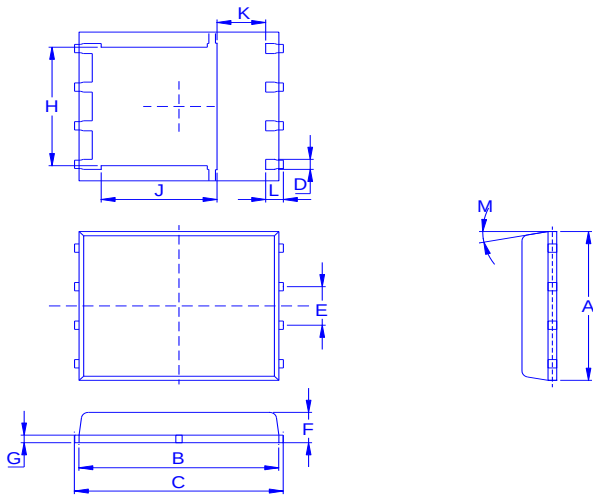
**Fig.11. Effective Transient Thermal Impedance**

Ordering & Marking Information:

Device Name: EMP85N10H for EDFN 5x6

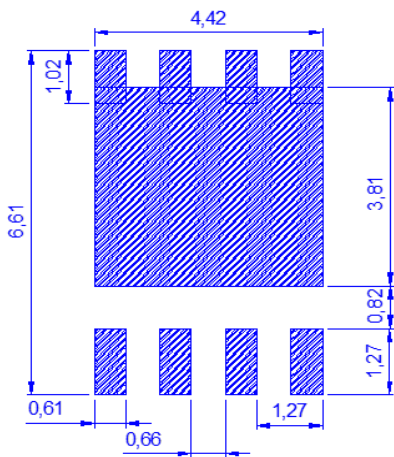


Outline Drawing

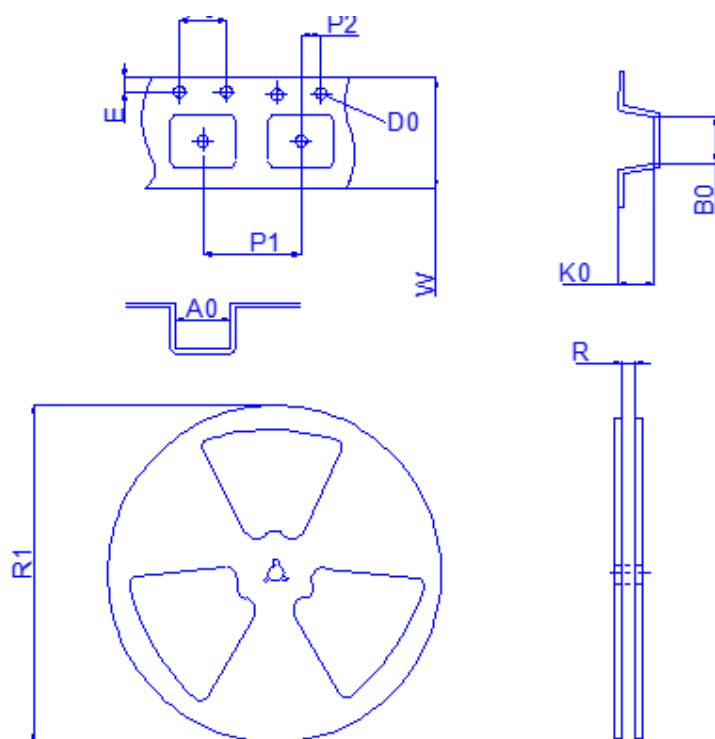


| Dimension | A   | B    | C    | D    | E    | F    | G    | H    | J    | K    | L    | M   |
|-----------|-----|------|------|------|------|------|------|------|------|------|------|-----|
| Min       | 4.8 | 5.55 | 5.9  | 0.3  | 1.17 | 0.85 | 0.15 | 3.61 | 3.18 | 1    | 0.38 | 0°  |
| Typ.      | 4.9 | 5.7  | 6    | 0.4  | 1.27 | 0.95 | 0.2  | 3.87 | 3.44 | 1.2  | 0.4  |     |
| Max       | 5.4 | 5.85 | 6.15 | 0.51 | 1.37 | 1.17 | 0.34 | 4.31 | 3.78 | 1.39 | 0.71 | 12° |

Footprint



◆ Tape&Reel Information:2500pcs/Reel (Dimension in millimeter)



|                    |                       |
|--------------------|-----------------------|
| Package            | EDFN5X6               |
| Reel               | 13"                   |
| Device orientation | <p>FEED DIRECTION</p> |

Dimension in mm

| Dimension | Carrier tape |     |     |     |     |     |     |     |     | Reel |     |
|-----------|--------------|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|
|           | A0           | B0  | D0  | E   | K0  | P0  | P1  | P2  | W   | R    | R1  |
| Typ.      | 6.4          | 5.3 | 1.5 | 1.8 | 1.6 | 4   | 8   | 2   | 12  | 12.4 | 330 |
| ±         | 0.2          | 0.2 | 0.1 | 0.1 | 0.6 | 0.1 | 0.1 | 0.1 | 0.3 | 2    | 2   |