

Singel N-Channel Logic Level Enhancement Mode Field Effect Transistor

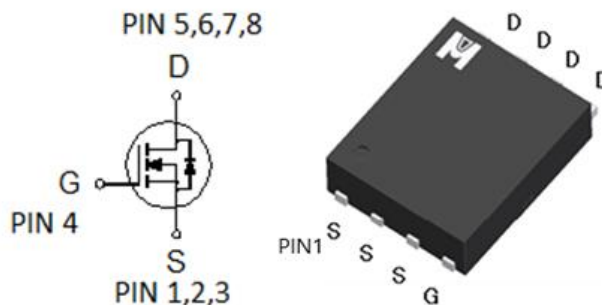
Product Summary:

|                     |               |
|---------------------|---------------|
| $BV_{DSS}$          | 30V           |
| $R_{DS(on)} (MAX.)$ | 4.0m $\Omega$ |
| $I_D$               | 75A           |

N Channel MOSFET

UIS, R<sub>g</sub> 100% Tested

RoHS & Halogen Free & TSCA Compliant



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

| PARAMETERS/TEST CONDITIONS                     |                           | SYMBOL         | LIMITS     | UNIT             |
|------------------------------------------------|---------------------------|----------------|------------|------------------|
| Gate-Source Voltage                            |                           | $V_{GS}$       | $\pm 20$   | V                |
| Continuous Drain Current                       | $T_C = 25^\circ\text{C}$  | $I_D$          | 75         | A                |
|                                                | $T_C = 100^\circ\text{C}$ |                | 45         |                  |
| Pulsed Drain Current <sup>1</sup>              |                           | $I_{DM}$       | 160        |                  |
| Avalanche Current                              |                           | $I_{AS}$       | 53         |                  |
| Avalanche Energy                               | $L = 0.1\text{mH}$        | $E_{AS}$       | 140        | mJ               |
| Repetitive Avalanche Energy <sup>2</sup>       | $L = 0.05\text{mH}$       | $E_{AR}$       | 70         |                  |
| Power Dissipation                              | $T_C = 25^\circ\text{C}$  | $P_D$          | 50         | W                |
|                                                | $T_C = 100^\circ\text{C}$ |                | 20         |                  |
| Operating Junction & Storage Temperature Range |                           | $T_J, T_{stg}$ | -55 to 150 | $^\circ\text{C}$ |

100% UIS testing in condition of  $V_D=25\text{V}$ ,  $L=0.1\text{mH}$ ,  $V_G=10\text{V}$ ,  $I_L=32\text{A}$ , Rated  $V_{DS}=30\text{V}$  N-CH

THERMAL RESISTANCE RATINGS

| THERMAL RESISTANCE  | SYMBOL          | TYPICAL | MAXIMUM | UNIT                        |
|---------------------|-----------------|---------|---------|-----------------------------|
| Junction-to-Case    | $R_{\theta JC}$ |         | 2.5     | $^\circ\text{C} / \text{W}$ |
| Junction-to-Ambient | $R_{\theta JA}$ |         | 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  $T_A = 25^\circ\text{C}$ .

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

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

| PARAMETER                                                               | SYMBOL                                 | TEST CONDITIONS                                                                            | LIMITS |      |      | UNIT |
|-------------------------------------------------------------------------|----------------------------------------|--------------------------------------------------------------------------------------------|--------|------|------|------|
|                                                                         |                                        |                                                                                            | MIN    | TYP  | MAX  |      |
| STATIC                                                                  |                                        |                                                                                            |        |      |      |      |
| Drain-Source Breakdown Voltage                                          | V <sub>(BR)DSS</sub>                   | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                                               | 30     |      |      | V    |
| Gate Threshold Voltage                                                  | V <sub>GS(th)</sub>                    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                 | 1      | 1.5  | 3    |      |
| Gate-Body Leakage                                                       | I <sub>GSS</sub>                       | V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V                                               |        |      | ±100 | nA   |
| Zero Gate Voltage Drain Current                                         | I <sub>DSS</sub>                       | V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V                                                |        |      | 1    | μA   |
|                                                                         |                                        | V <sub>DS</sub> = 20V, 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> = 10V, V <sub>GS</sub> = 10V                                               | 75     |      |      | A    |
| Drain-Source On-State Resistance <sup>1</sup>                           | R <sub>DS(ON)</sub>                    | V <sub>GS</sub> = 10V, I <sub>D</sub> = 30A                                                |        | 3.2  | 4.0  | mΩ   |
|                                                                         |                                        | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 24A                                               |        | 4.9  | 6.6  |      |
| Forward Transconductance <sup>1</sup>                                   | g <sub>fs</sub>                        | V <sub>DS</sub> = 5V, I <sub>D</sub> = 24A                                                 |        | 25   |      | S    |
| DYNAMIC                                                                 |                                        |                                                                                            |        |      |      |      |
| Input Capacitance                                                       | C <sub>iss</sub>                       | V <sub>GS</sub> = 0V, V <sub>DS</sub> = 15V, f = 1MHz                                      |        | 3570 |      | pF   |
| Output Capacitance                                                      | C <sub>oss</sub>                       |                                                                                            |        | 548  |      |      |
| Reverse Transfer Capacitance                                            | C <sub>rss</sub>                       |                                                                                            |        | 448  |      |      |
| Gate Resistance                                                         | R <sub>g</sub>                         | V <sub>GS</sub> = 15mV, V <sub>DS</sub> = 0V, f = 1MHz                                     |        | 1.2  |      | Ω    |
| Total Gate Charge <sup>1,2</sup>                                        | Q <sub>g</sub> (V <sub>GS</sub> =10V)  | V <sub>DS</sub> = 15V, V <sub>GS</sub> = 10V,<br>I <sub>D</sub> = 30A                      |        | 59   |      | nC   |
|                                                                         | Q <sub>g</sub> (V <sub>GS</sub> =4.5V) |                                                                                            |        | 25   |      |      |
| Gate-Source Charge <sup>1,2</sup>                                       | Q <sub>gs</sub>                        |                                                                                            |        | 7.2  |      |      |
| Gate-Drain Charge <sup>1,2</sup>                                        | Q <sub>gd</sub>                        |                                                                                            |        | 12.7 |      |      |
| Turn-On Delay Time <sup>1,2</sup>                                       | t <sub>d(on)</sub>                     | V <sub>DS</sub> = 15V,<br>I <sub>D</sub> = 5A, V <sub>GS</sub> = 10V, R <sub>GS</sub> = 3Ω |        | 18   |      | nS   |
| Rise Time <sup>1,2</sup>                                                | t <sub>r</sub>                         |                                                                                            |        | 12   |      |      |
| Turn-Off Delay Time <sup>1,2</sup>                                      | t <sub>d(off)</sub>                    |                                                                                            |        | 55   |      |      |
| Fall Time <sup>1,2</sup>                                                | t <sub>f</sub>                         |                                                                                            |        | 10   |      |      |
| SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T <sub>c</sub> = 25 °C) |                                        |                                                                                            |        |      |      |      |
| Continuous Current                                                      | I <sub>S</sub>                         |                                                                                            |        |      | 75   | A    |
| Pulsed Current <sup>3</sup>                                             | I <sub>SM</sub>                        |                                                                                            |        |      | 150  |      |
| Forward Voltage <sup>1</sup>                                            | V <sub>SD</sub>                        | I <sub>F</sub> = I <sub>S</sub> , V <sub>GS</sub> = 0V                                     |        |      | 1.3  | V    |
| Reverse Recovery Time                                                   | t <sub>rr</sub>                        | I <sub>F</sub> = I <sub>S</sub> , dI <sub>F</sub> /dt = 100A / μS                          |        | 30   |      | nS   |
| Peak Reverse Recovery Current                                           | I <sub>RM(REC)</sub>                   |                                                                                            |        | 200  |      | A    |
| Reverse Recovery Charge                                                 | Q <sub>rr</sub>                        |                                                                                            |        | 10   |      | nC   |

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

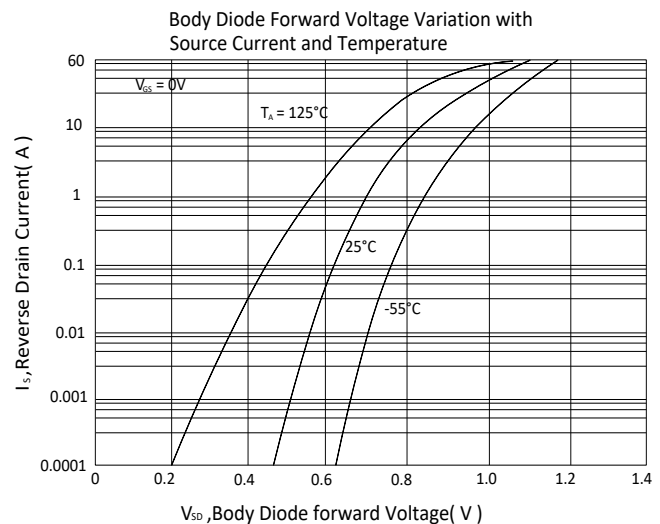
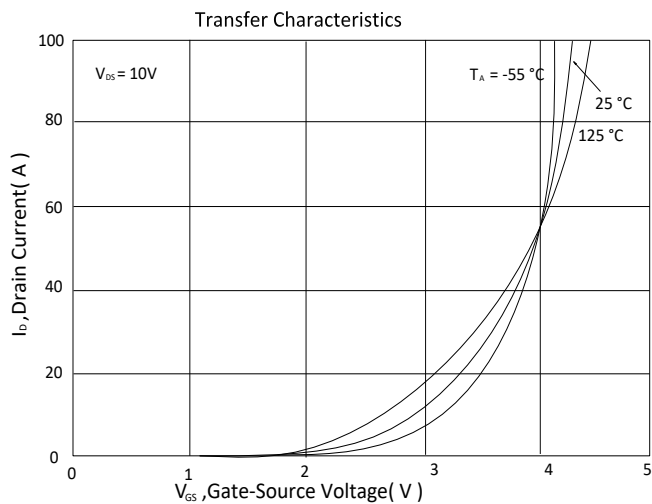
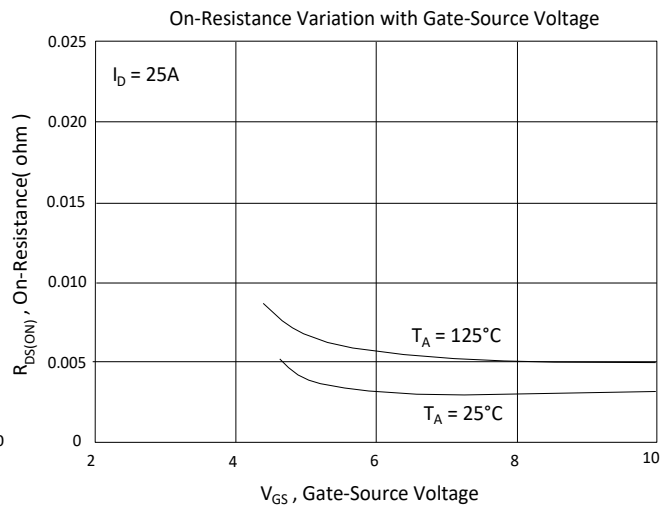
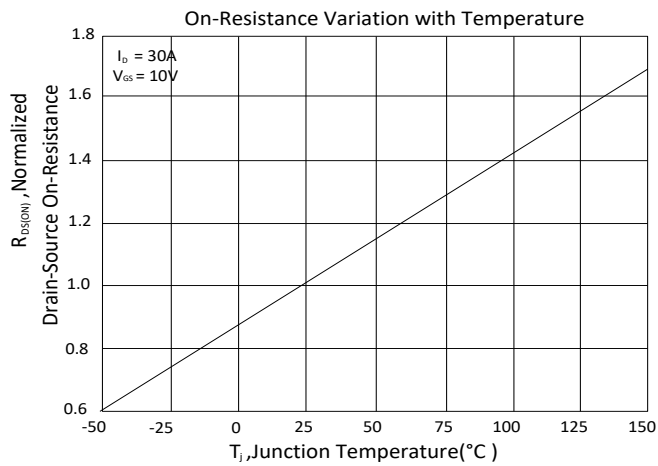
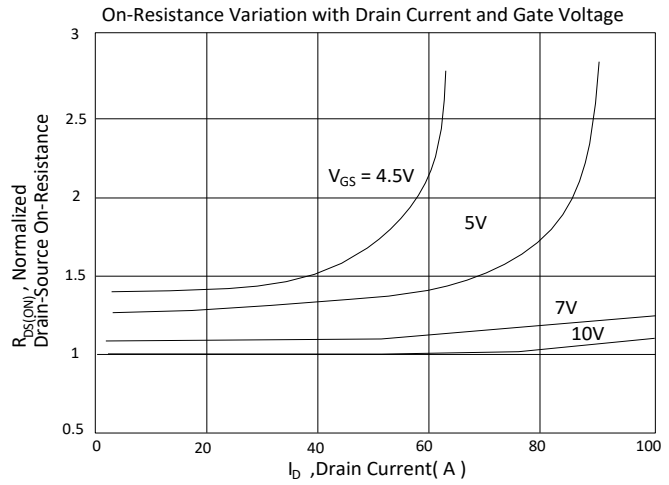
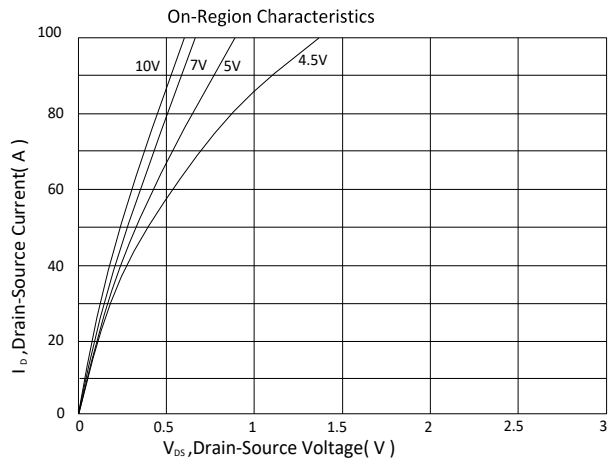
<sup>2</sup>Independent of operating temperature.

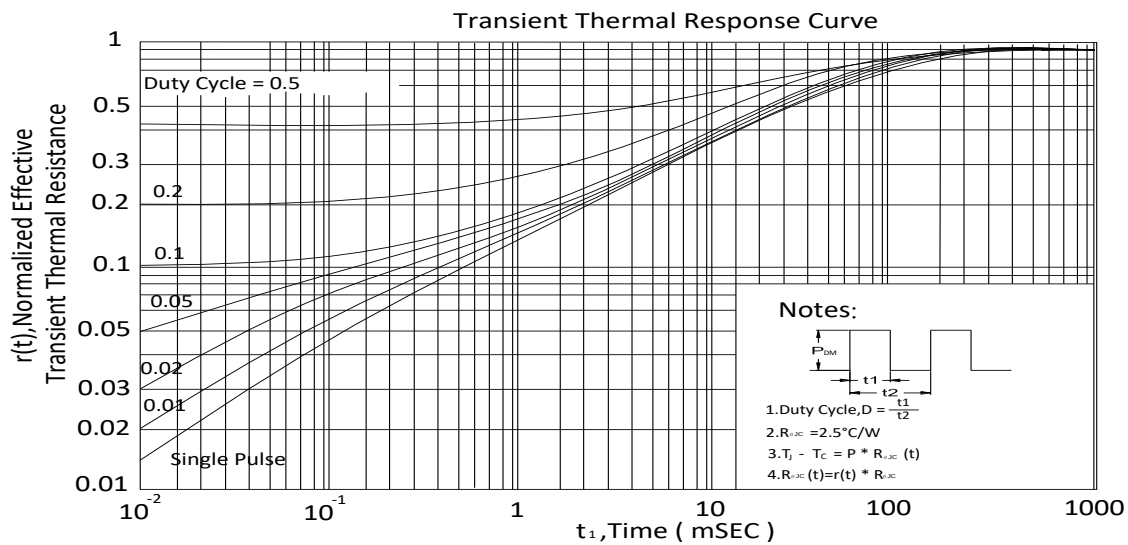
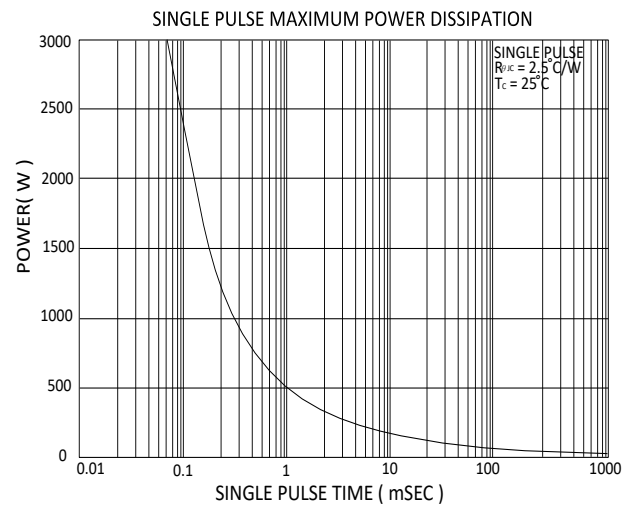
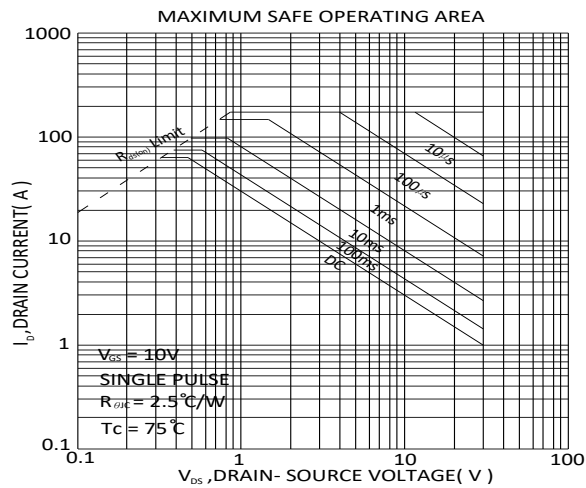
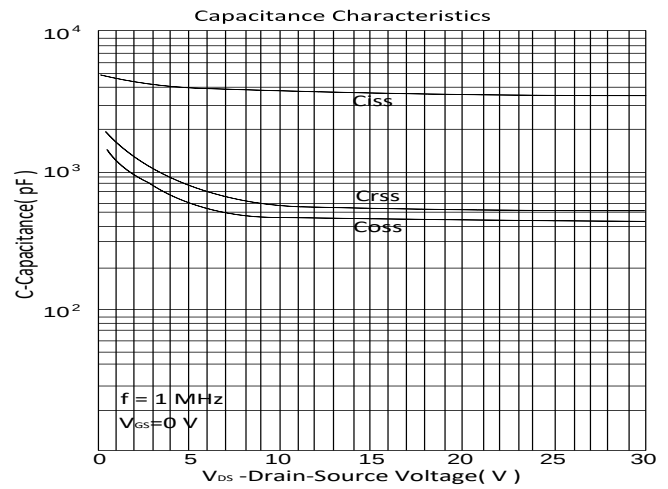
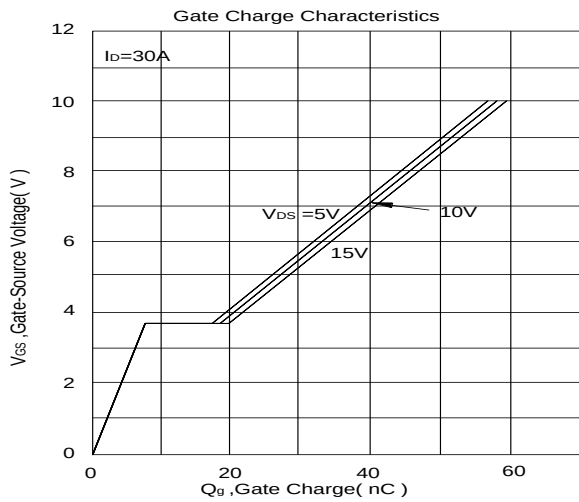
<sup>3</sup>Pulse width limited by maximum junction temperature.

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



TYPICAL CHARACTERISTICS





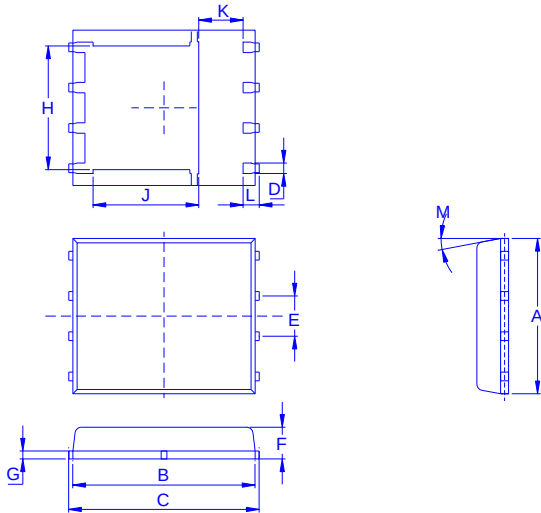
Ordering & Marking Information:

Device Name: EMB04N03H for EDFN5X6



- EMB04N03H: Device Name
- ABCDEFG: Date Code
- A: Assembly House
- B: Year(A:2008 B:2009 C:2010....)
- C: Month(A:01 B:02 C:03 D:04 E:05 F:06 G:07 H:08 I:09 J:10 K:11 L:12)
- DEFG: Serial No.

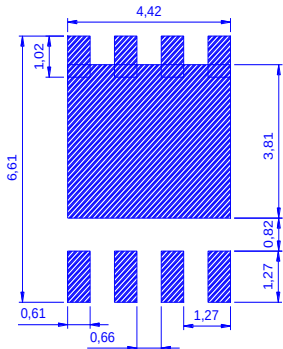
Outline Drawing



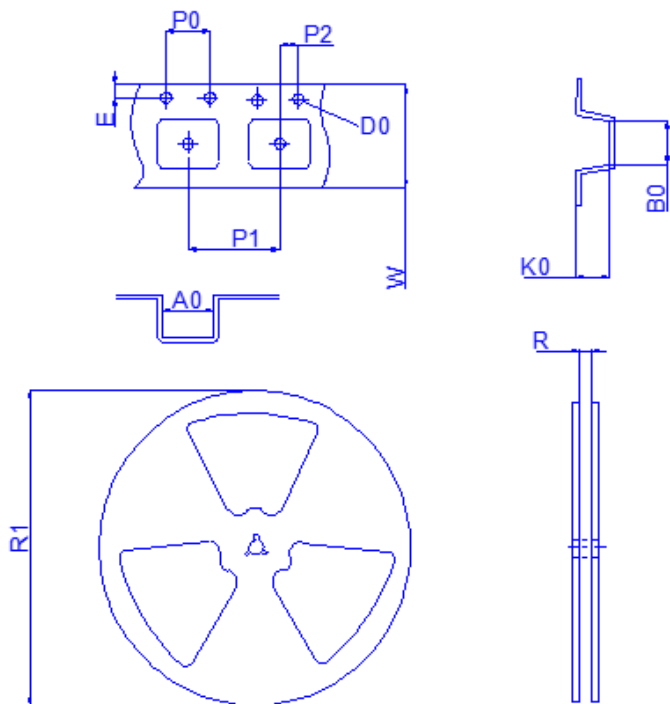
Dimension in mm

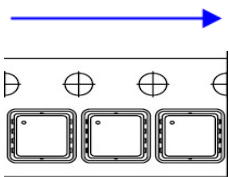
| Dimension | A   | B    | C    | D    | E    | F    | G    | H    | J    | K    | L    | M   |
|-----------|-----|------|------|------|------|------|------|------|------|------|------|-----|
| Min       | 4.8 | 5.55 | 5.9  | 0.3  | 1.17 | 0.85 | 0.15 | 3.61 | 3.18 | 1    | 0.38 | 0°  |
| Typ.      | 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° |

Recommended minimum pads



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



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

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   |