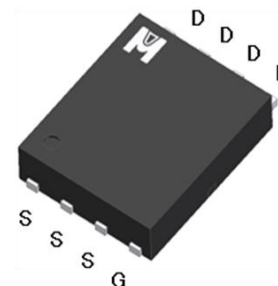
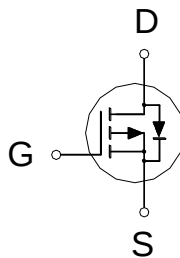


P-Channel Logic Level Enhancement Mode Field Effect Transistor

Product Summary:

|                     |              |
|---------------------|--------------|
| $BV_{DSS}$          | -30V         |
| $R_{DS(on)} (MAX.)$ | 12m $\Omega$ |
| $I_D$               | -50A         |



UIS, Rg 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                       | $T_C = 25^\circ\text{C}$                              | $I_D$          | -50        | A                |
|                                                | $T_C = 100^\circ\text{C}$                             |                | -36        |                  |
| Pulsed Drain Current <sup>1</sup>              |                                                       | $I_{DM}$       | -120       |                  |
| Avalanche Current                              |                                                       | $I_{AS}$       | -20        |                  |
| Avalanche Energy                               | $L = 0.1\text{mH}, I_D = -20\text{A}, R_G = 25\Omega$ | $E_{AS}$       | 20         | mJ               |
| 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  $V_D = -25\text{V}$ ,  $L = 0.1\text{mH}$ ,  $V_G = -10\text{V}$ ,  $I_L = -12\text{A}$ , Rated  $V_{DS} = -30\text{V}$  P-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 <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  $T_A = 25^\circ\text{C}$ .

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

ELECTRICAL CHARACTERISTICS ( $T_c = 25^\circ\text{C}$ , Unless Otherwise Noted)

| PARAMETER                                                               | SYMBOL        | TEST CONDITIONS                                          | LIMITS |      |           | UNIT       |
|-------------------------------------------------------------------------|---------------|----------------------------------------------------------|--------|------|-----------|------------|
|                                                                         |               |                                                          | MIN    | TYP  | MAX       |            |
| STATIC                                                                  |               |                                                          |        |      |           |            |
| Drain-Source Breakdown Voltage                                          | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = -250\mu A$                           | -30    |      |           | V          |
| Gate Threshold Voltage                                                  | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = -250\mu A$                       | -1     | -1.5 | -3        |            |
| Gate-Body Leakage                                                       | $I_{GSS}$     | $V_{DS} = 0V, V_{GS} = \pm 20V$                          |        |      | $\pm 100$ | nA         |
| Zero Gate Voltage Drain Current                                         | $I_{DSS}$     | $V_{DS} = -24V, V_{GS} = 0V$                             |        |      | -1        | $\mu A$    |
|                                                                         |               | $V_{DS} = -20V, V_{GS} = 0V, T_J = 125\text{ }^{\circ}C$ |        |      | -10       |            |
| On-State Drain Current <sup>1</sup>                                     | $I_{D(ON)}$   | $V_{DS} = -5V, V_{GS} = -10V$                            | -50    |      |           | A          |
| Drain-Source On-State Resistance <sup>1</sup>                           | $R_{DS(ON)}$  | $V_{GS} = -10V, I_D = -20A$                              |        | 10.5 | 12        | m $\Omega$ |
|                                                                         |               | $V_{GS} = -4.5V, I_D = -10A$                             |        | 15   | 20        |            |
| Forward Transconductance <sup>1</sup>                                   | $g_{fs}$      | $V_{DS} = -5V, I_D = -20A$                               |        | 30   |           | S          |
| DYNAMIC                                                                 |               |                                                          |        |      |           |            |
| Input Capacitance                                                       | $C_{iss}$     | $V_{GS} = 0V, V_{DS} = -15V, f = 1MHz$                   |        | 2363 |           | pF         |
| Output Capacitance                                                      | $C_{oss}$     |                                                          |        | 385  |           |            |
| Reverse Transfer Capacitance                                            | $C_{rss}$     |                                                          |        | 326  |           |            |
| Gate Resistance                                                         | $R_g$         | $V_{GS} = 15mV, V_{DS} = 0V, f = 1MHz$                   |        | 4.0  |           | $\Omega$   |
| Total Gate Charge <sup>1,2</sup>                                        | $Q_g$         | $V_{DS} = -15V, V_{GS} = -10V, I_D = -20A$               |        | 45   |           | nC         |
| Gate-Source Charge <sup>1,2</sup>                                       | $Q_{gs}$      |                                                          |        | 5.6  |           |            |
| Gate-Drain Charge <sup>1,2</sup>                                        | $Q_{gd}$      |                                                          |        | 8.5  |           |            |
| Turn-On Delay Time <sup>1,2</sup>                                       | $t_{d(on)}$   | $V_{DS} = -15V, I_D = -5A, V_{GS} = -10V, R_G = 3\Omega$ |        | 15   |           | nS         |
| Rise Time <sup>1,2</sup>                                                | $t_r$         |                                                          |        | 12   |           |            |
| Turn-Off Delay Time <sup>1,2</sup>                                      | $t_{d(off)}$  |                                                          |        | 35   |           |            |
| Fall Time <sup>1,2</sup>                                                | $t_f$         |                                                          |        | 10   |           |            |
| SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T <sub>C</sub> = 25 °C) |               |                                                          |        |      |           |            |
| Continuous Current                                                      | $I_S$         |                                                          |        |      | -50       | A          |
| Pulsed Current <sup>3</sup>                                             | $I_{SM}$      |                                                          |        |      | -120      |            |
| Forward Voltage <sup>1</sup>                                            | $V_{SD}$      | $I_F = -20A, V_{GS} = 0V$                                |        |      | -1.2      | V          |
| Reverse Recovery Time                                                   | $t_{rr}$      | $I_F = I_S, dI_F/dt = 100A / \mu S$                      |        | 32   |           | nS         |
| Reverse Recovery Charge                                                 | $Q_{rr}$      |                                                          |        | 26   |           | nC         |

<sup>1</sup>Pulse test : Pulse Width  $\leq 300 \mu\text{sec}$ , Duty Cycle  $\leq 2\%$ .

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

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

Ordering & Marking Information:

Device Name: EMB12P03H for EDFN 5 x 6



→ B12P03: Device Name

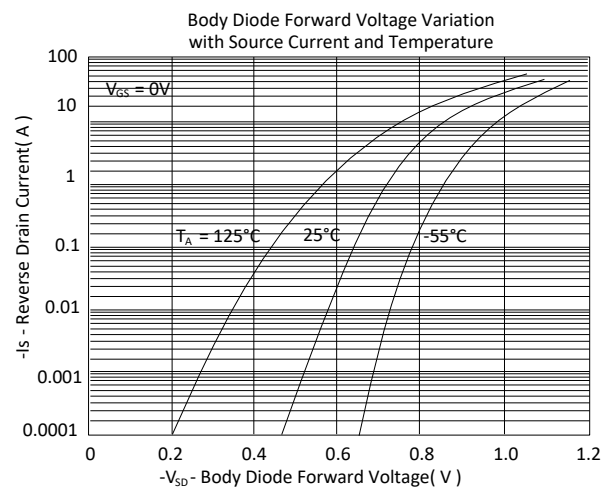
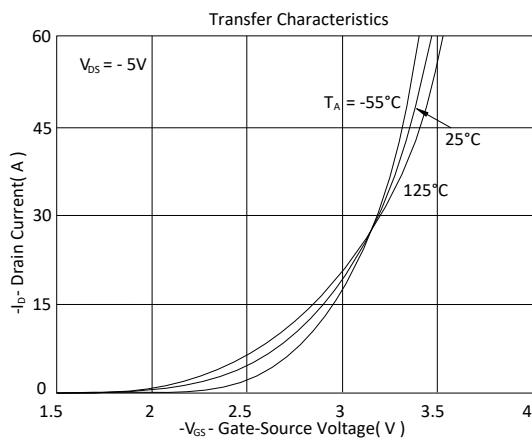
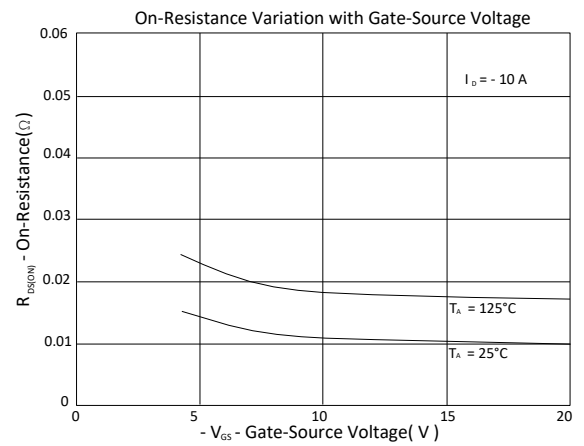
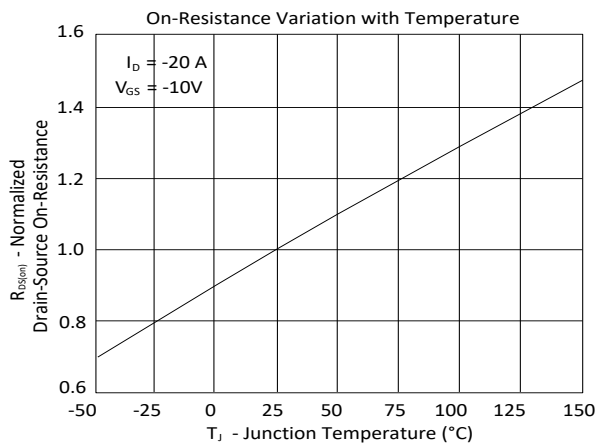
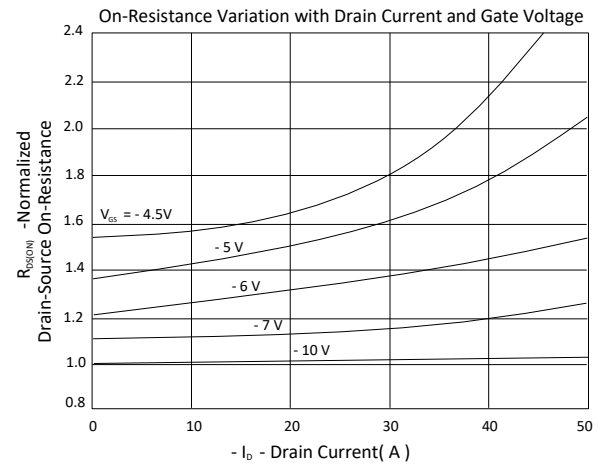
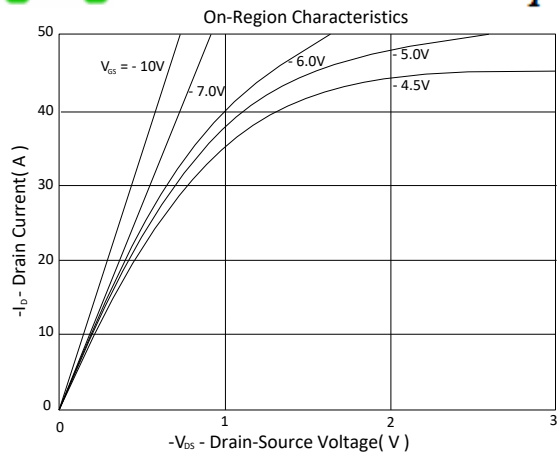
→ ABCDEFGH: Date Code

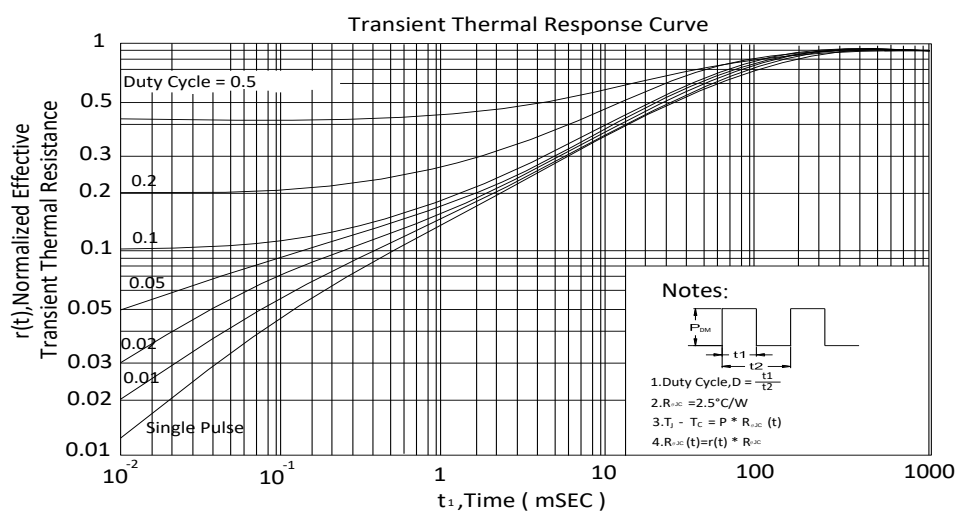
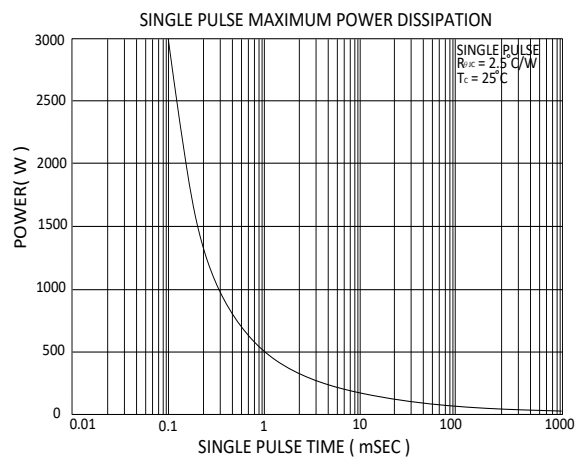
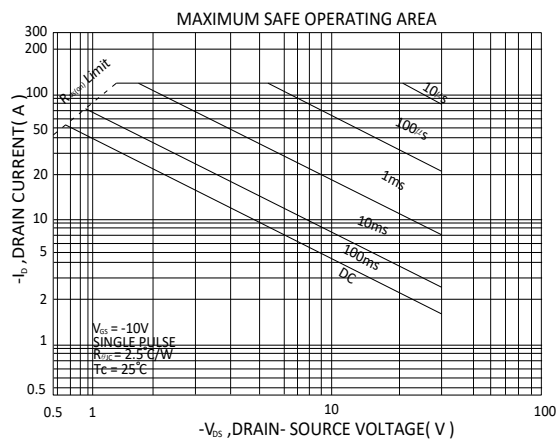
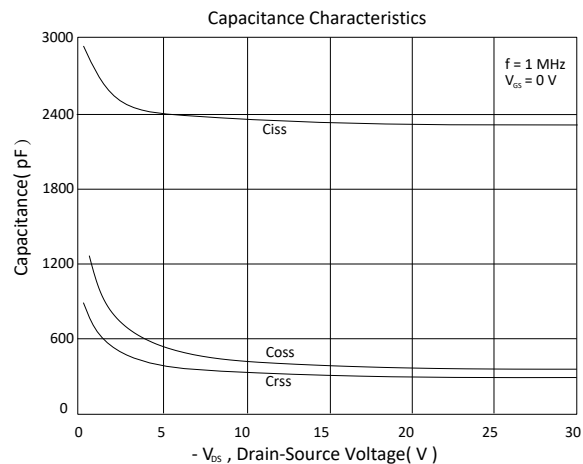
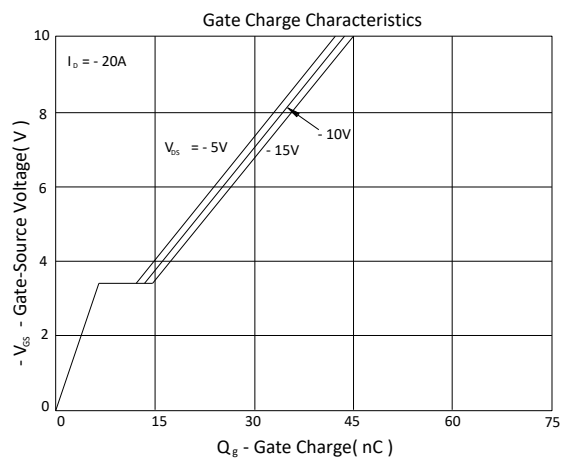
A: Assembly House

B: Year(A:2008 B:2009 C:2010....)

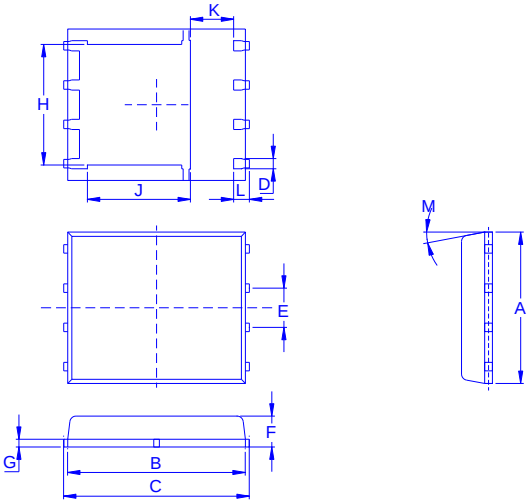
C: Month(A:01 B:02 C:03 D:04 E:05 F:06 G:07 H:08 I:09 J:10 K:11 L:12)

DEFG: Serial No.





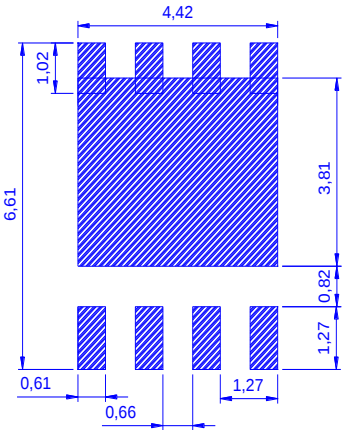
Outline Drawing



Dimension in mm

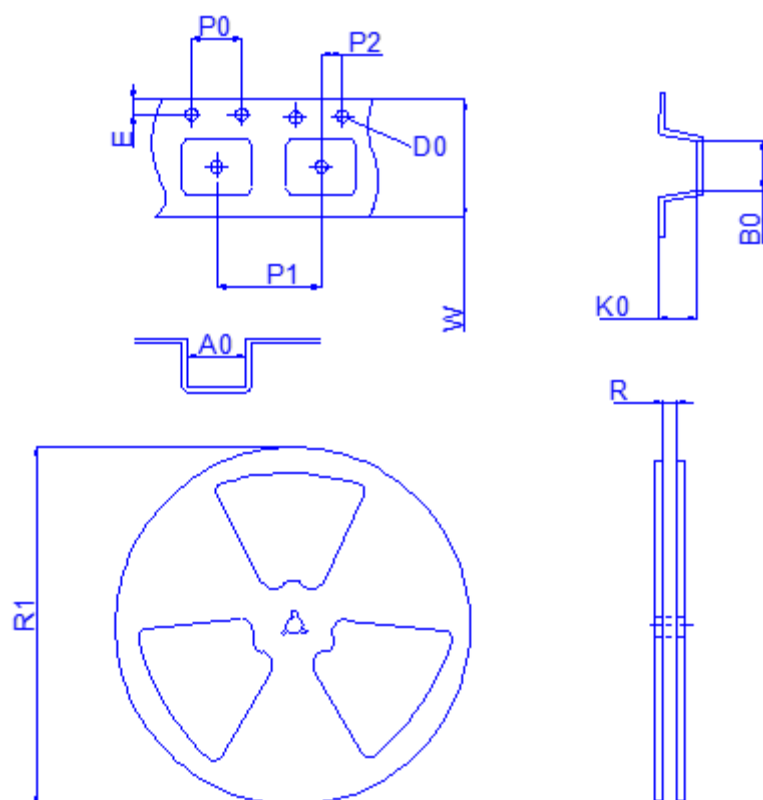
| Dimension | A   | B    | C    | D    | E    | F    | G    | H    | J    | K    | L    | M   |
|-----------|-----|------|------|------|------|------|------|------|------|------|------|-----|
| Min       | 4.8 | 5.55 | 5.9  | 0.3  | 1.17 | 0.85 | 0.15 | 3.61 | 3.18 | 1    | 0.38 | 0°  |
| Typ.      |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

Footprint





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



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