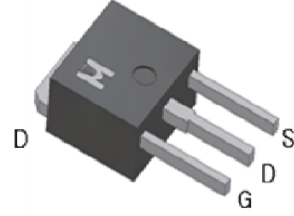


N-Channel Logic Level Enhancement Mode Field Effect Transistor

Product Summary:

|                     |              |
|---------------------|--------------|
| $BV_{DSS}$          | 600V         |
| $R_{DS(on)} (MAX.)$ | $2.5 \Omega$ |
| $I_D$               | 4A           |



UIS, 100% Tested

Pb-Free Lead Plating & Halogen Free



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

| PARAMETERS/TEST CONDITIONS                     |   | SYMBOL           | LIMITS     | UNIT             |
|--|---|------------------|------------|------------------|
| Gate-Source Voltage                            |   | $V_{GS}$         | $\pm 30$   | V                |
| Continuous Drain Current                       | $T_C = 25^\circ\text{C}$                          | $I_D$            | 4          | A                |
|  | $T_C = 100^\circ\text{C}$                         |                  | 2.5        |                  |
| Pulsed Drain Current <sup>1</sup>              |   | $I_{DM}$         | 16         |                  |
| Avalanche Current                              |   | $I_{AS}$         | 3          |                  |
| Avalanche Energy                               | $L = 3\text{mH}, I_D = 3\text{A}, R_G = 25\Omega$ | $E_{AS}$         | 13.5       | mJ               |
| Repetitive Avalanche Energy <sup>2</sup>       | $L = 0.5\text{mH}$                                | $E_{AR}$         | 2.25       |                  |
| Power Dissipation                              | $T_C = 25^\circ\text{C}$                          | $P_D$            | 30         | W                |
|  | $T_C = 100^\circ\text{C}$                         |                  | 12         |                  |
| Operating Junction & Storage Temperature Range |   | $T_{j}, T_{stg}$ | -55 to 150 | $^\circ\text{C}$ |

THERMAL RESISTANCE RATINGS

| THERMAL RESISTANCE  | SYMBOL          | TYPICAL | MAXIMUM | UNIT                        |
|---------------------|-----------------|---------|---------|-----------------------------|
| Junction-to-Case    | $R_{\theta JC}$ |         | 4.2     | $^\circ\text{C} / \text{W}$ |
| Junction-to-Ambient | $R_{\theta JA}$ |         | 110     |                             |

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

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

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

| PARAMETER   | SYMBOL        | TEST CONDITIONS  | LIMITS |     |           | UNIT     |
|---|---------------|--|--------|-----|-----------|----------|
|   |               |  | MIN    | TYP | MAX       |          |
| <b>STATIC</b>   |               |  |        |     |           |          |
| Drain-Source Breakdown Voltage  | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu A$                                  | 600    |     |           | V        |
| Gate Threshold Voltage  | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = 250\mu A$                              | 2      | 3   | 5         |          |
| Gate-Body Leakage   | $I_{GSS}$     | $V_{DS} = 0V, V_{GS} = \pm 30V$                                |        |     | $\pm 100$ | nA       |
| Zero Gate Voltage Drain Current   | $I_{DSS}$     | $V_{DS} = 600V, V_{GS} = 0V$                                   |        |     | 10        | $\mu A$  |
|   |               | $V_{DS} = 480V, V_{GS} = 0V, T_J = 125\text{ }^\circ\text{C}$  |        |     | 25        |          |
| Drain-Source On-State Resistance <sup>1</sup>   | $R_{DS(on)}$  | $V_{GS} = 10V, I_D = 2A$                                       |        | 2.1 | 2.5       | $\Omega$ |
| Forward Transconductance <sup>1</sup>   | $g_{fs}$      | $V_{DS} = 25V, I_D = 2A$                                       |        | 2   |           | S        |
| <b>DYNAMIC</b>  |               |  |        |     |           |          |
| Input Capacitance   | $C_{iss}$     | $V_{GS} = 0V, V_{DS} = 25V, f = 1MHz$                          |        | 455 |           | pF       |
| Output Capacitance  | $C_{oss}$     |  |        | 49  |           |          |
| Reverse Transfer Capacitance  | $C_{rss}$     |  |        | 2.9 |           |          |
| Total Gate Charge <sup>1,2</sup>  | $Q_g$         | $V_{DS} = 300V, V_{GS} = 10V,$<br>$I_D = 1A$                   |        | 8.4 |           | nC       |
| Gate-Source Charge <sup>1,2</sup>   | $Q_{gs}$      |  |        | 2.2 |           |          |
| Gate-Drain Charge <sup>1,2</sup>  | $Q_{gd}$      |  |        | 2.2 |           |          |
| Turn-On Delay Time <sup>1,2</sup>   | $t_{d(on)}$   | $V_{DS} = 300V,$<br>$I_D = 1.5A, V_{GS} = 10V, R_G = 20\Omega$ |        | 20  |           | nS       |
| Rise Time <sup>1,2</sup>  | $t_r$         |  |        | 30  |           |          |
| Turn-Off Delay Time <sup>1,2</sup>  | $t_{d(off)}$  |  |        | 20  |           |          |
| Fall Time <sup>1,2</sup>  | $t_f$         |  |        | 30  |           |          |
| <b>SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (<math>T_c = 25\text{ }^\circ\text{C}</math>)</b> |               |  |        |     |           |          |
| Continuous Current  | $I_S$         |  |        |     | 4         | A        |
| Pulsed Current <sup>3</sup>   | $I_{SM}$      |  |        |     | 16        |          |
| Forward Voltage <sup>1</sup>  | $V_{SD}$      | $I_F = I_S, V_{GS} = 0V$                                       |        |     | 1.4       | V        |
| Reverse Recovery Time   | $t_{rr}$      | $I_F = I_S, di_F/dt = 100A / \mu S$                            |        | 0.3 |           | $\mu S$  |
| Reverse Recovery Charge   | $Q_{rr}$      |  |        |     | 1.0       | $\mu C$  |

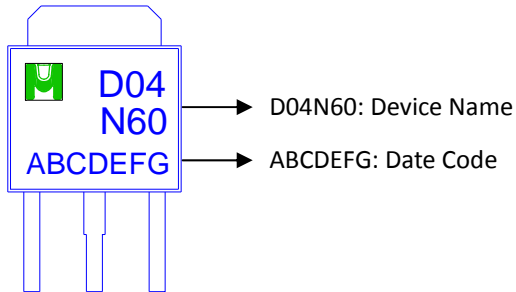
<sup>1</sup>Pulse test : Pulse Width  $\leq 300\ \mu\text{sec}$ , Duty Cycle  $\leq 2\%$ .

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

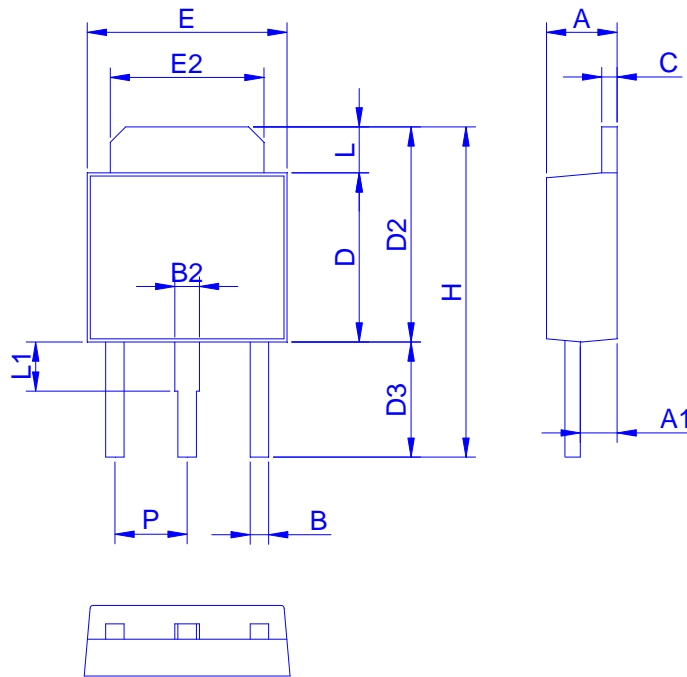
<sup>3</sup>Pulse width limited by maximum junction temperature.

Ordering & Marking Information:

Device Name: EMD04N60CS for IPAK (TO-251)



Outline Drawing



Dimension in mm

| Dimension | A    | A1   | B    | B2   | C    | D    | D2   | D3   | E    | E2   | H    | L    | L1   | P    |
|-----------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Min.      | 2.10 | 0.90 | 0.40 | 0.60 | 0.40 | 5.30 | 6.70 | 3.40 | 6.30 | 4.80 | 10.2 | 0.89 | 0.90 | 2.10 |
| Max.      | 2.50 | 1.50 | 0.90 | 1.15 | 0.60 | 6.25 | 7.30 | 4.30 | 6.80 | 5.50 | 11.5 | 1.40 | 1.80 | 2.50 |



TYPICAL CHARACTERISTICS

