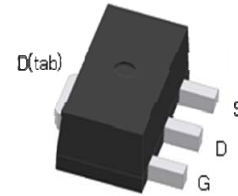


P-Channel Logic Level Enhancement Mode Field Effect Transistor

Product Summary:

|                     |              |
|---------------------|--------------|
| $BV_{DSS}$          | -30V         |
| $R_{DS(on)}$ (MAX.) | 50m $\Omega$ |
| $I_D$               | -4A          |



Pb-Free Lead Plating & Halogen Free



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

| PARAMETERS/TEST CONDITIONS                     |                                   | SYMBOL           | LIMITS     | UNIT             |
|--|-----------------------------------|------------------|------------|------------------|
| Gate-Source Voltage                            |                                   | $V_{GS}$         | $\pm 20$   | V                |
| Continuous Drain Current                       | $T_A = 25\text{ }^\circ\text{C}$  | $I_D$            | -4         | A                |
|  | $T_A = 100\text{ }^\circ\text{C}$ |                  | -3         |                  |
| Pulsed Drain Current <sup>1</sup>              |                                   | $I_{DM}$         | -16        |                  |
| Power Dissipation                              | $T_A = 25\text{ }^\circ\text{C}$  | $P_D$            | 1.47       | W                |
|  | $T_A = 70\text{ }^\circ\text{C}$  |                  | 0.94       |                  |
| 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                 | $R_{\theta JC}$ |         | 18      | $^\circ\text{C} / \text{W}$ |
| Junction-to-Ambient <sup>3</sup> | $R_{\theta JA}$ |         | 85      |                             |

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

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

<sup>3</sup>85 $^\circ\text{C} / \text{W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper.



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  | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = -250\mu A$                                   | -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        | $\mu A$   |
|   |               | $V_{DS} = -20V, V_{GS} = 0V, T_J = 125\text{ }^\circ\text{C}$    |        |      | -10       |           |
| On-State Drain Current <sup>1</sup>   | $I_{D(ON)}$   | $V_{DS} = -5V, V_{GS} = -10V$                                    | -4     |      |           | A         |
| Drain-Source On-State Resistance <sup>1</sup>   | $R_{DS(ON)}$  | $V_{GS} = -10V, I_D = -4A$                                       |        | 43   | 50        | $m\Omega$ |
|   |               | $V_{GS} = -5V, I_D = -3A$  |        | 60   | 75        |           |
| Forward Transconductance <sup>1</sup>   | $g_{fs}$      | $V_{DS} = -5V, I_D = -4A$  |        | 16   |           | S         |
| <b>DYNAMIC</b>  |               |  |        |      |           |           |
| Input Capacitance   | $C_{iss}$     | $V_{GS} = 0V, V_{DS} = -15V, f = 1MHz$                           |        | 820  |           | $pF$      |
| Output Capacitance  | $C_{oss}$     |  |        | 122  |           |           |
| Reverse Transfer Capacitance  | $C_{rss}$     |  |        | 97   |           |           |
| Total Gate Charge <sup>1,2</sup>  | $Q_g$         | $V_{DS} = -15V, V_{GS} = 10V,$<br>$I_D = -4A$                    |        | 9    |           | nC        |
| Gate-Source Charge <sup>1,2</sup>   | $Q_{gs}$      |  |        | 2.2  |           |           |
| Gate-Drain Charge <sup>1,2</sup>  | $Q_{gd}$      |  |        | 2.5  |           |           |
| Turn-On Delay Time <sup>1,2</sup>   | $t_{d(on)}$   | $V_{DS} = -15V,$<br>$I_D = -1A, V_{GS} = -10V, R_{GS} = 6\Omega$ |        | 5.5  |           | nS        |
| Rise Time <sup>1,2</sup>  | $t_r$         |  |        | 10   |           |           |
| Turn-Off Delay Time <sup>1,2</sup>  | $t_{d(off)}$  |  |        | 18   |           |           |
| Fall Time <sup>1,2</sup>  | $t_f$         |  |        | 15   |           |           |
| <b>SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (<math>T_c = 25\text{ }^\circ\text{C}</math>)</b> |               |  |        |      |           |           |
| Continuous Current  | $I_S$         |  |        |      | -2.3      | A         |
| Pulsed Current <sup>3</sup>   | $I_{SM}$      |  |        |      | -9.2      |           |
| Forward Voltage <sup>1</sup>  | $V_{SD}$      | $I_F = I_S, V_{GS} = 0V$   |        |      | -1.3      | V         |
| Reverse Recovery Time   | $t_{rr}$      | $I_F = I_S, di_F/dt = 100A / \mu S$                              |        | 15   |           | nS        |
| Reverse Recovery Charge   | $Q_{rr}$      |  |        | 8    |           | nC        |

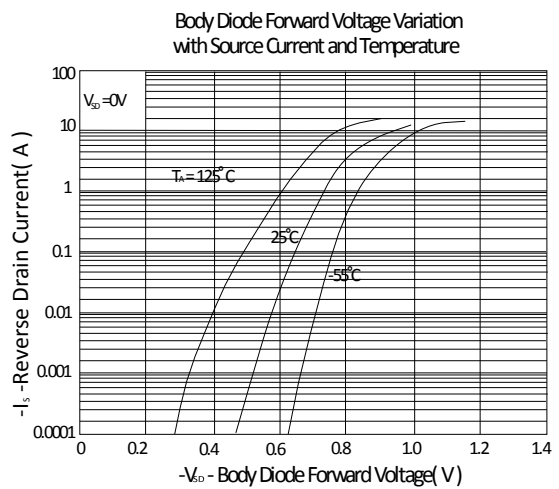
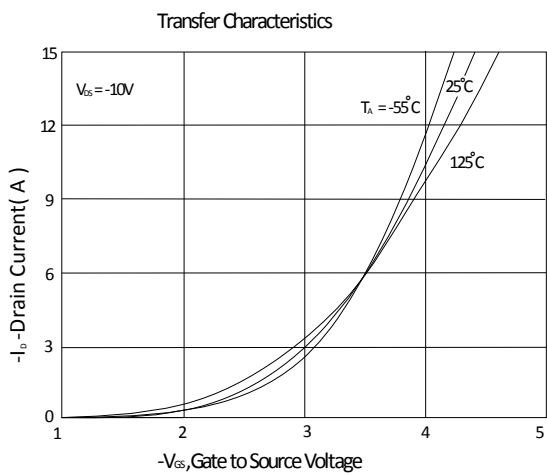
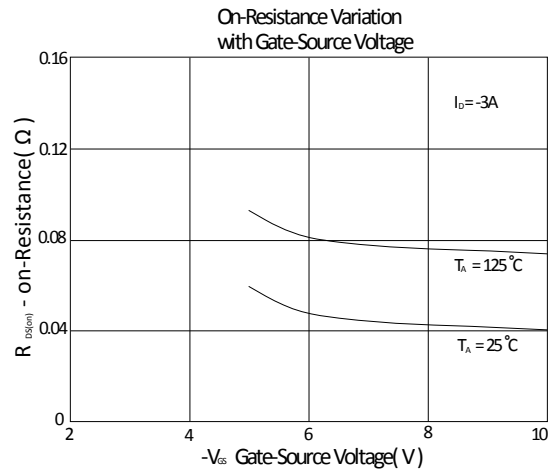
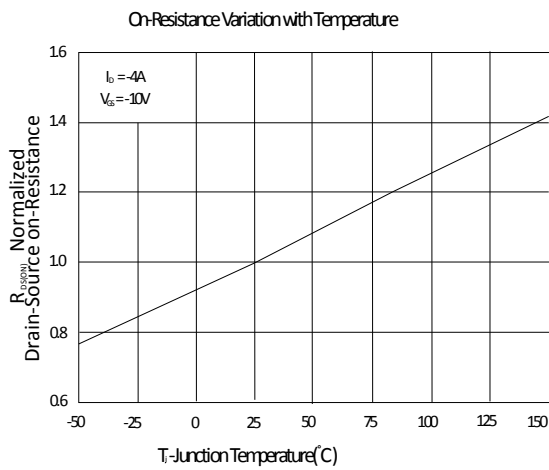
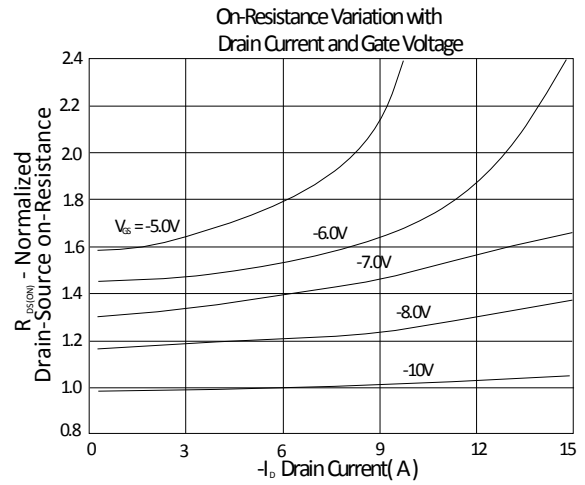
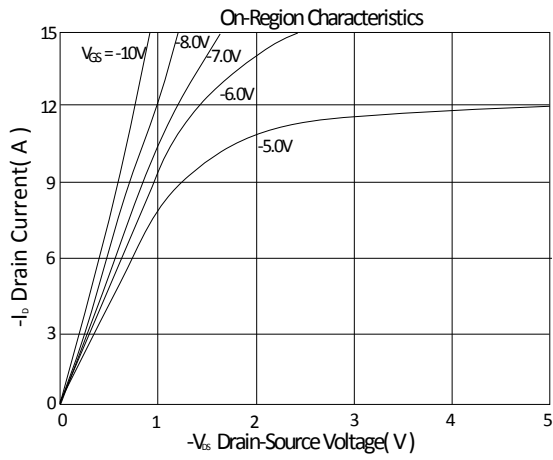
<sup>1</sup>Pulse test : Pulse Width  $\leq 300\ \mu\text{sec}$ , Duty Cycle  $\leq 2\%$ .

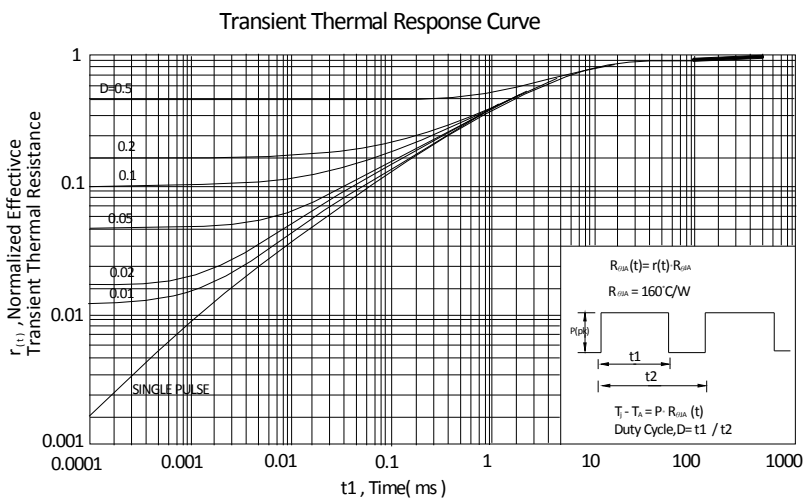
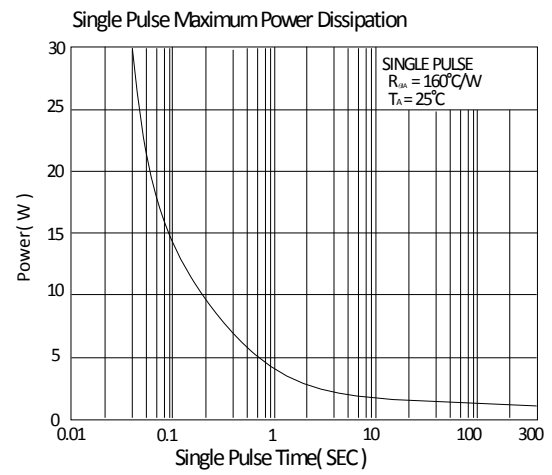
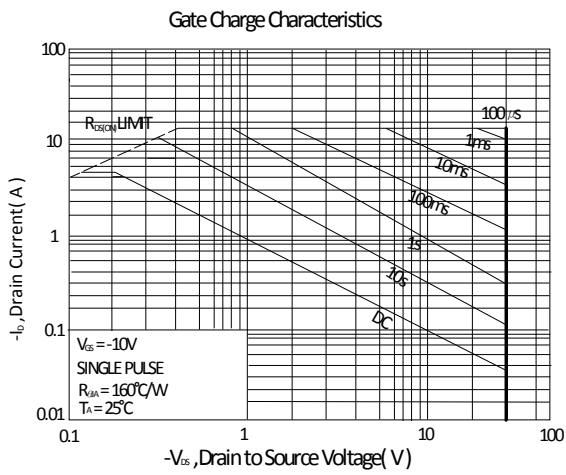
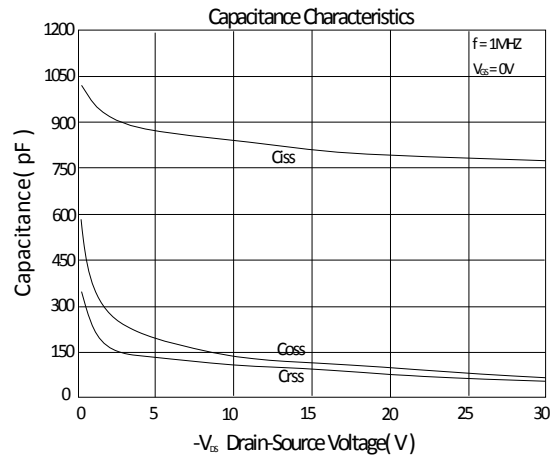
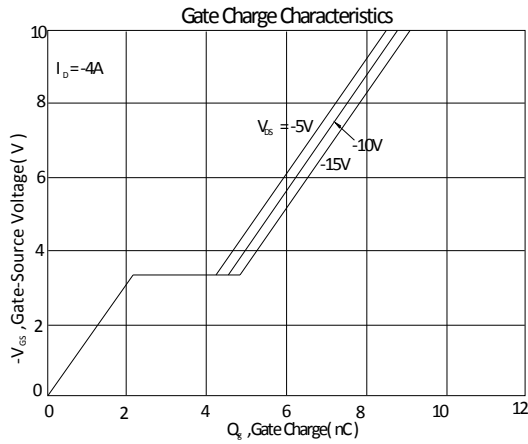
<sup>2</sup>Independent of operating temperature.

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



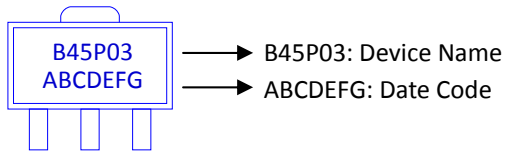
TYPICAL CHARACTERISTICS



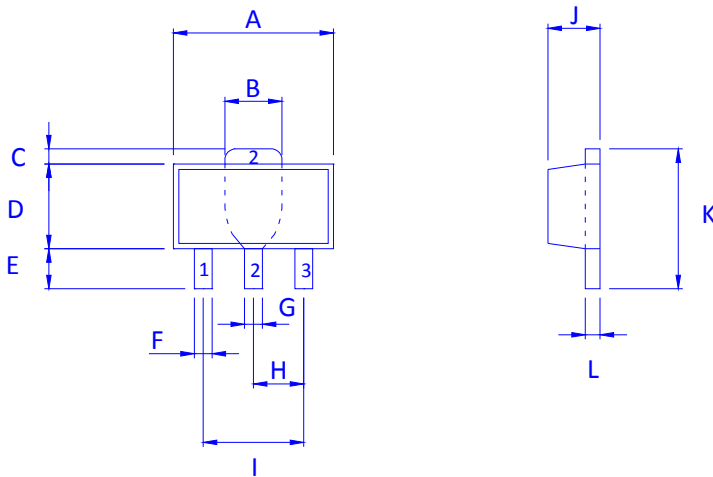


Ordering & Marking Information:

Device Name: EMB45P03P for SOT-89



Outline Drawing



Dimension in mm

| Dimension | A    | B    | C    | D    | E    | F    | G    | H    | I    | J    | K    | L    |
|-----------|------|------|------|------|------|------|------|------|------|------|------|------|
| in.       | 4.30 | 1.60 | 0.40 | 2.40 | 0.80 | 0.40 | 0.40 | 1.40 | 2.80 | 1.30 | 3.80 | 0.30 |
| Typ.      |      |      |      |      |      |      |      |      |      |      |      |      |
| Max.      | 4.70 | 1.80 | 0.60 | 2.60 | 1.40 | 0.50 | 0.60 | 1.60 | 3.20 | 1.70 | 4.60 | 0.50 |

Footprint

