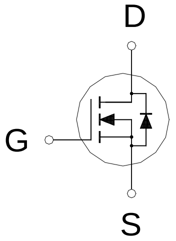
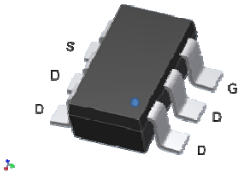
**N-Channel Logic Level Enhancement Mode Field Effect Transistor**

## Product Summary:

| | |
|---|---|
| $BV_{DSS}$ | 20V |
| $R_{DSON}$ (MAX.) | 20mΩ |
| $I_D$ | 6A |





Pb-Free Lead Plating & Halogen Free

### ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25 °C Unless Otherwise Noted)

| PARAMETERS/TEST CONDITIONS | | SYMBOL | LIMITS | UNIT |
|---|---|---|---|---|
| Gate-Source Voltage | | $V_{GS}$ | ±12 | V |
| Continuous Drain Current | $T_A$ = 25 °C | $I_D$ | 6 | A |
| | $T_A$ = 70 °C | | 4 | |
| Pulsed Drain Current[1] | | $I_{DM}$ | 24 | |
| Power Dissipation | $T_A$ = 25 °C | $P_D$ | 1.92 | W |
| | $T_A$ = 70 °C | | 1.23 | |
| Operating Junction & Storage Temperature Range | | $T_j$, $T_{stg}$ | -55 to 150 | °C |

### THERMAL RESISTANCE RATINGS

| THERMAL RESISTANCE | SYMBOL | TYPICAL | MAXIMUM | UNIT |
|---|---|---|---|---|
| Junction-to-Ambient[3] | $R_{\theta JA}$ (T ≤ 10sec) | | 65 | °C / W |
| | $R_{\theta JA}$ (Steady State) | | 100 | |

[1] Pulse width limited by maximum junction temperature.

[2] Duty cycle $\leq 1\%$

[3] Pulse width limited by maximum junction temperature.

**ELECTRICAL CHARACTERISTICS ($T_J$ = 25 °C, Unless Otherwise Noted)**

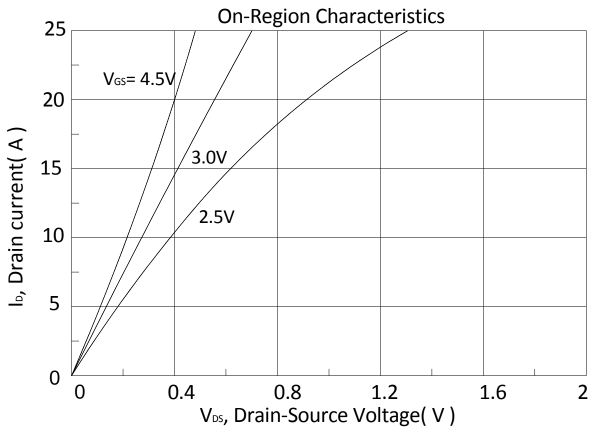
| PARAMETER | SYMBOL | TEST CONDITIONS | LIMITS | | | UNIT |
|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | |
| STATIC | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ = 250µA | 20 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA | 0.45 | 0.75 | 1.2 | |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0V, $V_{GS}$ = ±12V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 16V, $V_{GS}$ = 0V | | | 1 | µA |
| | | $V_{DS}$ = 16V, $V_{GS}$ = 0V, $T_J$ = 125 °C | | | 10 | |
| On-State Drain Current[1] | $I_{D(ON)}$ | $V_{DS}$ = 5V, $V_{GS}$ = 4.5V | 6 | | | A |
| Drain-Source On-State Resistance[1] | $R_{DS(ON)}$ | $V_{GS}$ = 4.5V, $I_D$ = 6A | | 18 | 20 | mΩ |
| | | $V_{GS}$ = 2.5V, $I_D$ = 5A | | 28 | 35 | |
| Forward Transconductance[1] | $g_{fs}$ | $V_{DS}$ = 5V, $I_D$ = 6A | | 7 | | S |
| DYNAMIC | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = 10V, f = 1MHz | | 560 | | pF |
| Output Capacitance | $C_{oss}$ | | | 166 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 150 | | |
| Total Gate Charge[1,2] | $Q_g$ | $V_{DS}$ = 10V, $V_{GS}$ = 4.5V, $I_D$ = 6A | | 8.5 | | nC |
| Gate-Source Charge[1,2] | $Q_{gs}$ | | | 1.5 | | |
| Gate-Drain Charge[1,2] | $Q_{gd}$ | | | 3.5 | | |
| Turn-On Delay Time[1,2] | $t_{d(on)}$ | $V_{DS}$ = 10V, $I_D$ = 1A, $V_{GS}$ = 4.5V, $R_{GS}$ = 6Ω | | 12 | | nS |
| Rise Time[1,2] | $t_r$ | | | 15 | | |
| Turn-Off Delay Time[1,2] | $t_{d(off)}$ | | | 30 | | |
| Fall Time[1,2] | $t_f$ | | | 15 | | |
| **SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS ($T_C$ = 25 °C)** | | | | | | |
| Continuous Current | $I_S$ | | | | 2 | A |
| Pulsed Current[3] | $I_{SM}$ | | | | 8 | |
| Forward Voltage[1] | $V_{SD}$ | $I_F$ = $I_S$, $V_{GS}$ = 0V | | | 1.2 | V |

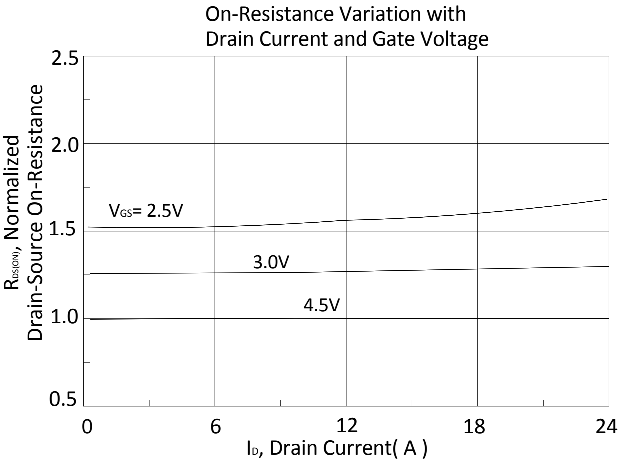
[1] Pulse test : Pulse Width ≤ 300 µsec, Duty Cycle ≤ 2%.

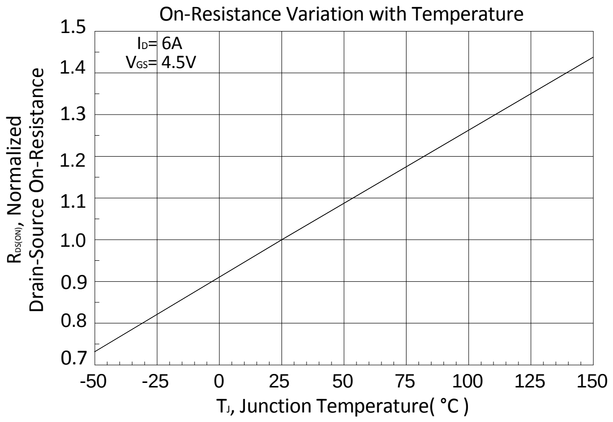
[2] Independent of operating temperature.

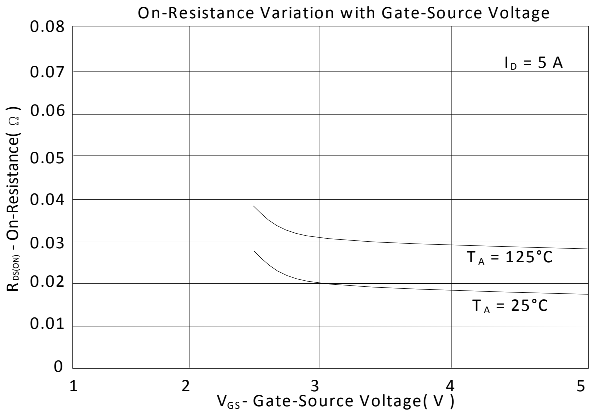
[3] Pulse width limited by maximum junction temperature.

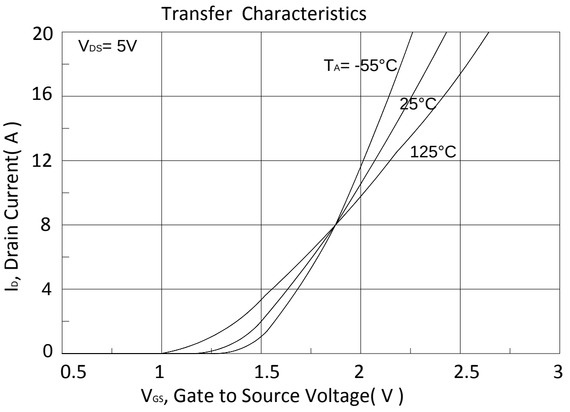
## TYPICAL CHARACTERISTICS

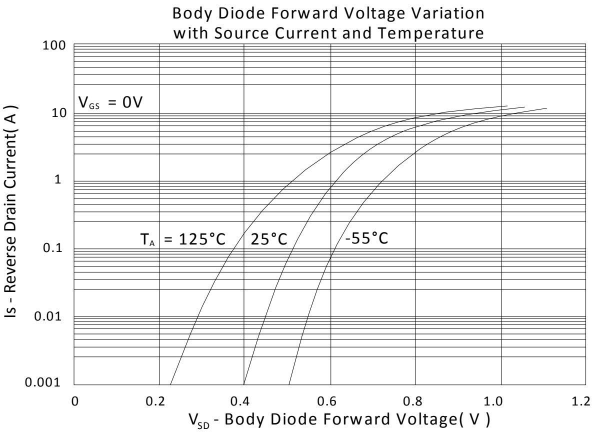


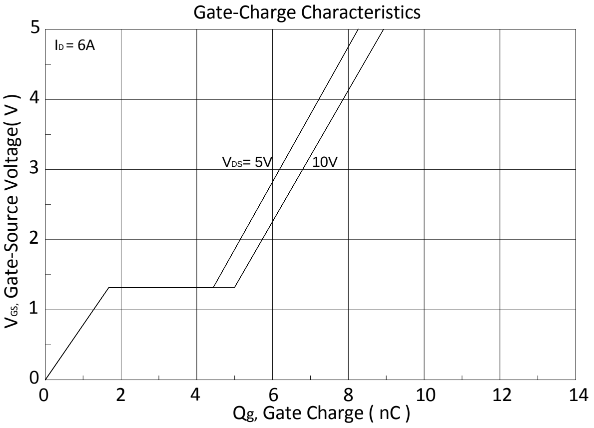


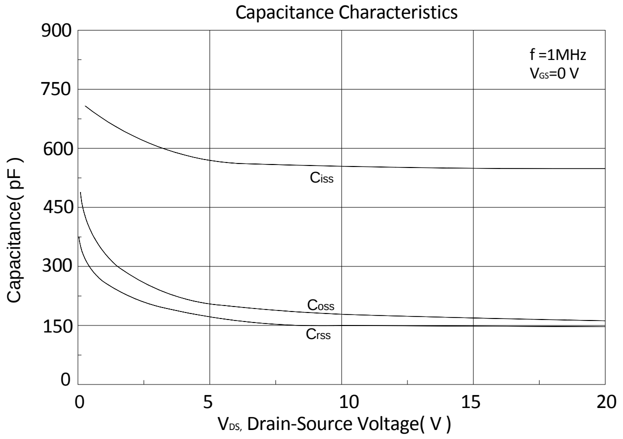


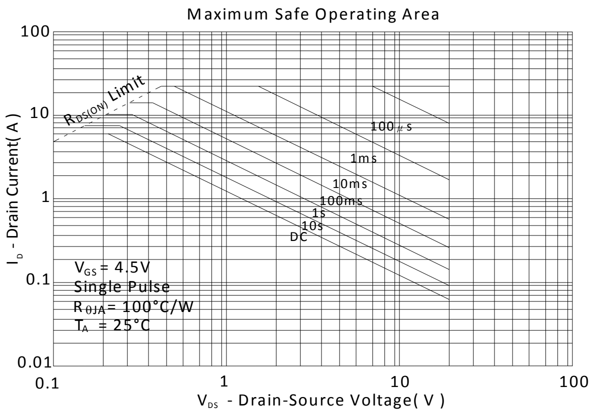


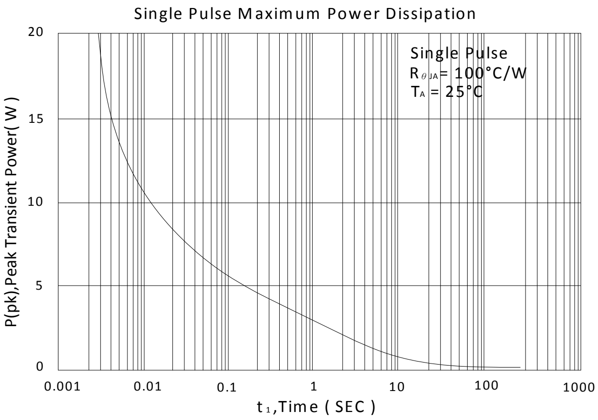


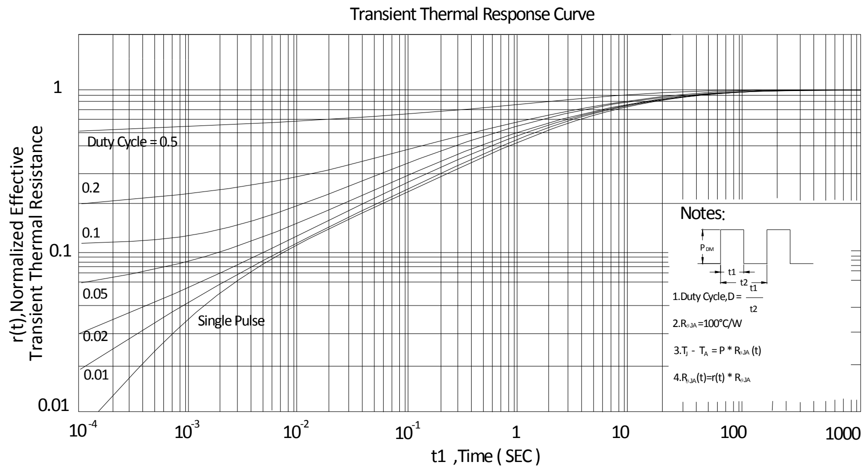



Gate-Charge Characteristics


Capacitance Characteristics


Maximum Safe Operating Area


Single Pulse Maximum Power Dissipation


Transient Thermal Response Curve

Notes:

1.Duty Cycle,D = $\frac{t1}{t2}$

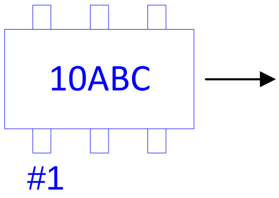
2.$R_{θJA}$=100°C/W

3.$T_J$ - $T_A$ = P * $R_{θJA}$ (t)

4.$R_{θJA}$(t)=r(t) * $R_{θJA}$

## Ordering & Marking Information:

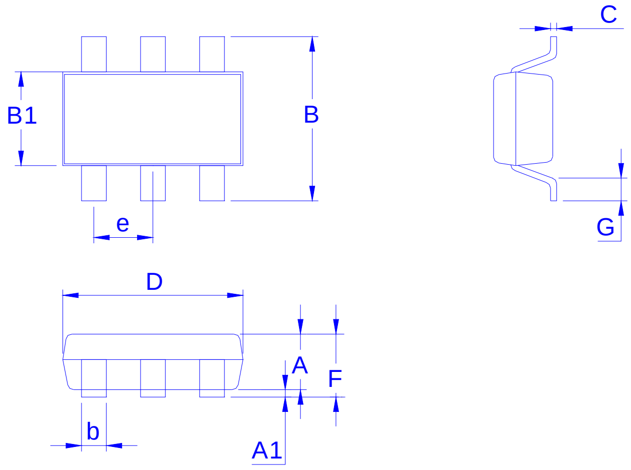
Device Name: EMF20N02K for TSOP-6



10: Device Code, 10 for EMF20N02K

ABC: Date Code

## Outline Drawing



Dimension in mm

| Dimension | A | A1 | B | B1 | b | C | D | e | F | G |
|---|---|---|---|---|---|---|---|---|---|---|
| Min. | 0.70 | 0 | 2.50 | 1.50 | 0.30 | 0.08 | 2.70 |  | 0.70 | 0.30 |
| Typ. | 0.95 |  | 2.80 | 1.60 | 0.40 |  | 2.90 | 0.95 |  |  |
| Max. | 1.00 | 0.10 | 3.10 | 1.70 | 0.50 | 0.20 | 3.10 |  | 1.10 | 0.60 |

## Footprint