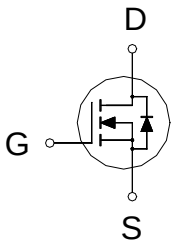
杰力科技股份有限公司
Excelliance MOS Corporation

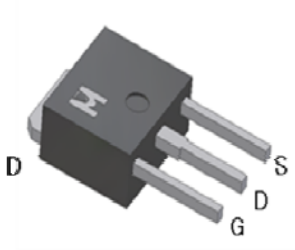
**EMB09N03CS**

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

Product Summary:

| | |
|---|---|
| $BV_{DSS}$ | 30V |
| $R_{DSON\ (MAX.)}$ | 9mΩ |
| $I_D$ | 50A |




UIS, Rg 100% Tested

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 | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current | $T_C$ = 25 °C | $I_D$ | 50 | A |
| | $T_C$ = 100 °C | | 35 | |
| Pulsed Drain Current[1] | | $I_{DM}$ | 140 | |
| Avalanche Current | | $I_{AS}$ | 37.5 | |
| Avalanche Energy | L = 0.1mH, ID=37.5A, RG=25Ω | $E_{AS}$ | 70 | mJ |
| Repetitive Avalanche Energy[2] | L = 0.05mH | $E_{AR}$ | 15 | |
| Power Dissipation | $T_C$ = 25 °C | $P_D$ | 50 | W |
| | $T_C$ = 100 °C | | 20 | |
| Operating Junction & Storage Temperature Range | | $T_j$, $T_{stg}$ | -55 to 150 | °C |

**THERMAL RESISTANCE RATINGS**

| THERMAL RESISTANCE | SYMBOL | TYPICAL | MAXIMUM | UNIT |
|---|---|---|---|---|
| Junction-to-Case | $R_{\theta JC}$ | | 2.5 | °C / W |
| Junction-to-Ambient | $R_{\theta JA}$ | | 75 | |

[1]Pulse width limited by maximum junction temperature.

[2]Duty cycle ≤ 1%

**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 | 30 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | 1 | 1.7 | 3 | |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0V, $V_{GS}$ = ±20V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 24V, $V_{GS}$ = 0V | | | 1 | μA |
| | | $V_{DS}$ = 20V, $V_{GS}$ = 0V, $T_J$ = 125 °C | | | 25 | |
| On-State Drain Current[1] | $I_{D(ON)}$ | $V_{DS}$ = 10V, $V_{GS}$ = 10V | 50 | | | A |
| Drain-Source On-State Resistance[1] | $R_{DS(ON)}$ | $V_{GS}$ = 10V, $I_D$ = 25A | | 7.5 | 9 | mΩ |
| | | $V_{GS}$ = 4.5V, $I_D$ = 15A | | 11 | 13.5 | |
| Forward Transconductance[1] | $g_{fs}$ | $V_{DS}$ = 5V, $I_D$ = 20A | | 20 | | S |
| **DYNAMIC** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = 15V, f = 1MHz | | 828 | | pF |
| Output Capacitance | $C_{oss}$ | | | 196 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 174 | | |
| Gate Resistance | $R_g$ | $V_{GS}$ = 15mV, $V_{DS}$ = 0V, f = 1MHz | | 1.7 | | Ω |
| Total Gate Charge[1,2] | $Q_g$($V_{GS}$=10V) | $V_{DS}$ = 15V, $V_{GS}$ = 10V, $I_D$ = 25A | | 17.6 | | nC |
| | $Q_g$($V_{GS}$=4.5V) | | | 12.5 | | |
| Gate-Source Charge[1,2] | $Q_{gs}$ | | | 2.8 | | |
| Gate-Drain Charge[1,2] | $Q_{gd}$ | | | 7.4 | | |
| Turn-On Delay Time[1,2] | $t_{d(on)}$ | $V_{DS}$ = 15V, $I_D$ = 25A, $V_{GS}$ = 10V, $R_{GS}$ = 2.7Ω | | 8 | | nS |
| Rise Time[1,2] | $t_r$ | | | 18 | | |
| Turn-Off Delay Time[1,2] | $t_{d(off)}$ | | | 20 | | |
| Fall Time[1,2] | $t_f$ | | | 3 | | |
| **SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS ($T_C$ = 25 °C)** | | | | | | |
| Continuous Current | $I_S$ | | | | 50 | A |
| Pulsed Current[3] | $I_{SM}$ | | | | 140 | |
| Forward Voltage[1] | $V_{SD}$ | $I_F$ = $I_S$, $V_{GS}$ = 0V | | | 1.3 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_F$ = $I_S$, $dI_F/dt$ = 100A / μS | | 22 | | nS |
| Peak Reverse Recovery Current | $I_{RM(REC)}$ | | | 180 | | A |
| Reverse Recovery Charge | $Q_{rr}$ | | | 12 | | nC |

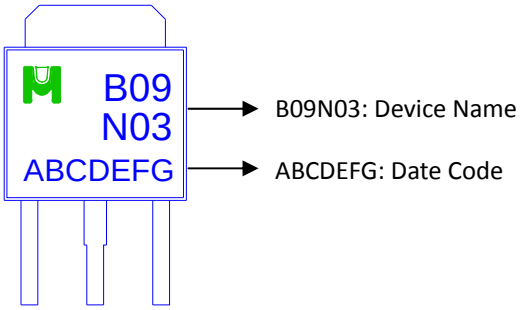
[1]Pulse test : Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%.

[2]Independent of operating temperature.

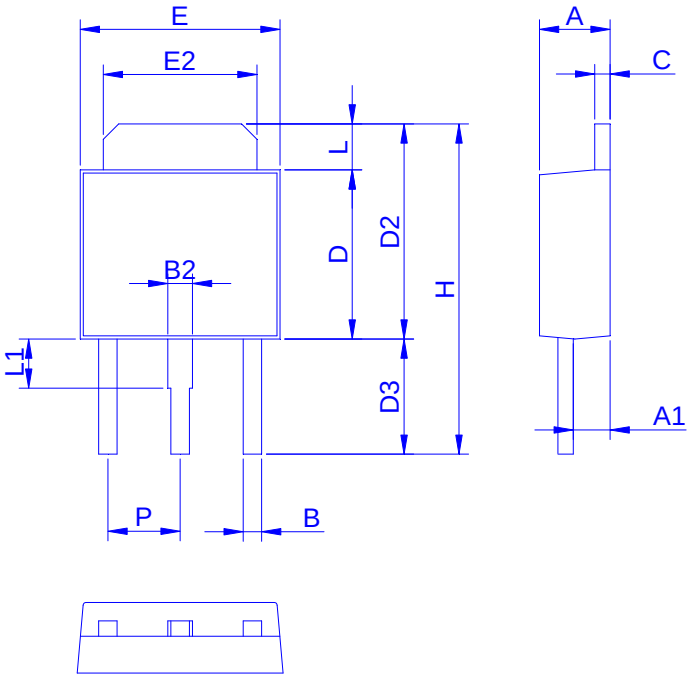
[3]Pulse width limited by maximum junction temperature.

## Ordering & Marking Information:

Device Name: EMB09N03CS for IPAK (TO-251)



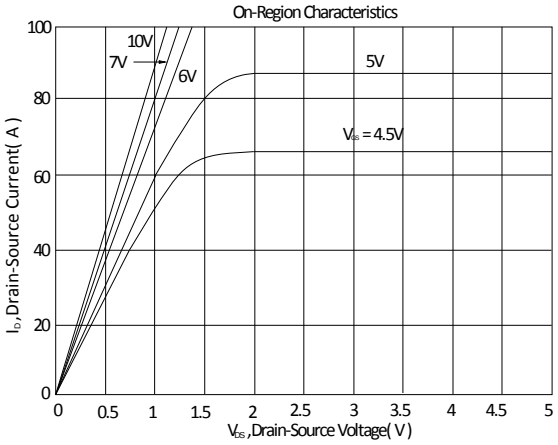

## Outline Drawing

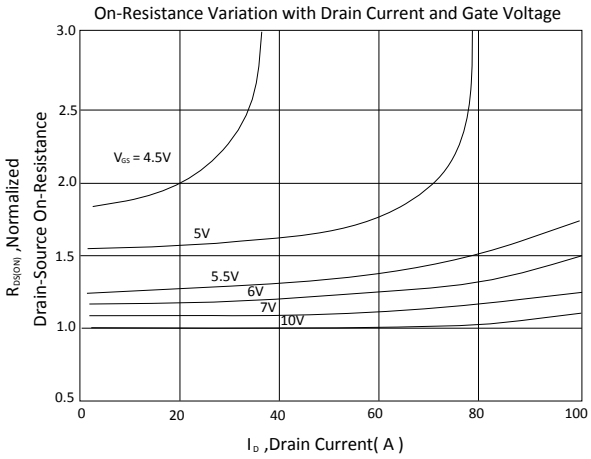


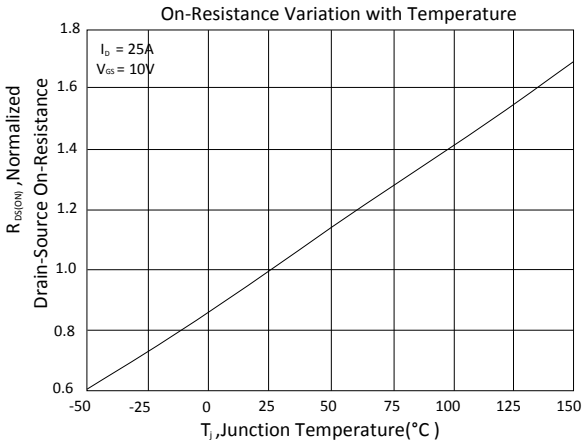

Dimension in mm

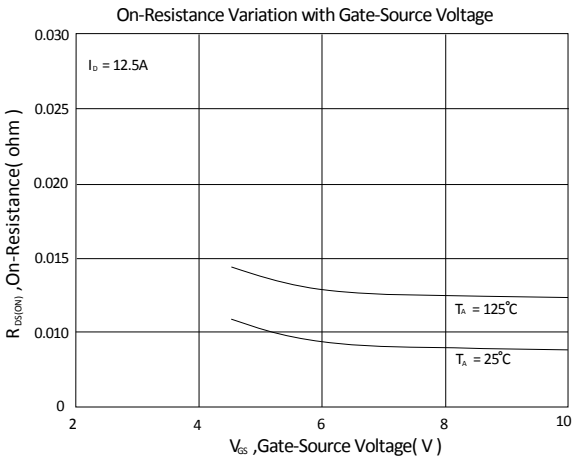
| Dimension | A | A1 | B | B2 | C | D | D2 | D3 | E | E2 | H | L | L1 | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Min. | 2.10 | 0.90 | 0.40 | 0.60 | 0.40 | 5.30 | 6.70 | 3.40 | 6.30 | 4.80 | 10.2 | 0.89 | 0.90 | 2.10 |
| Max. | 2.50 | 1.50 | 0.90 | 1.15 | 0.60 | 6.25 | 7.30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

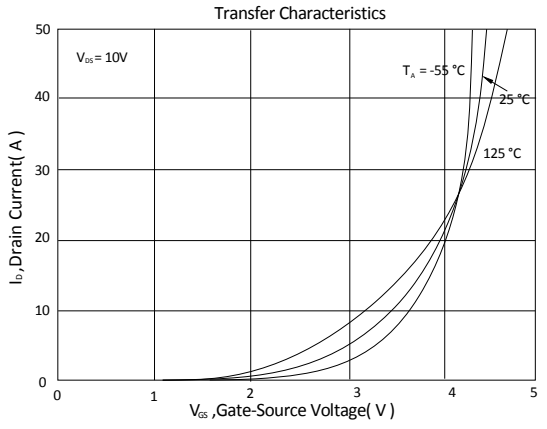
**TYPICAL CHARACTERISTICS**

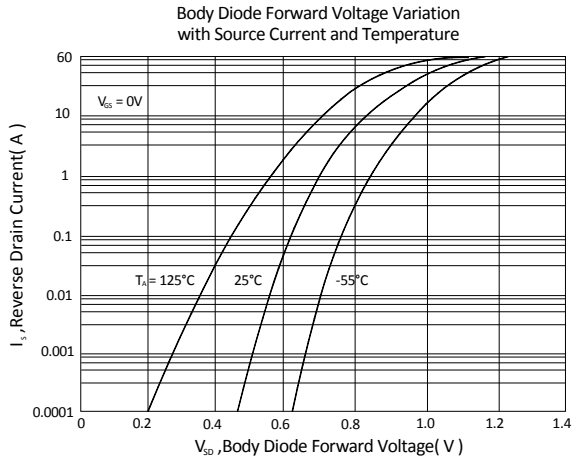


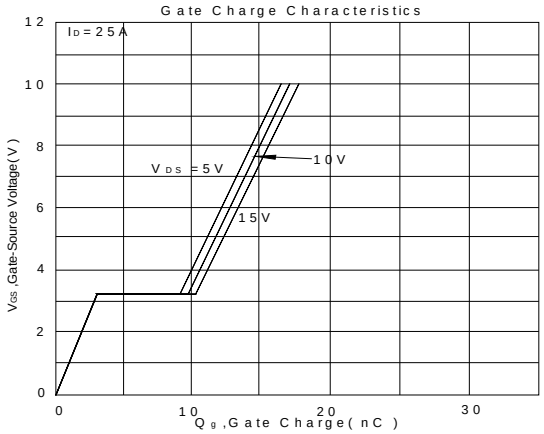



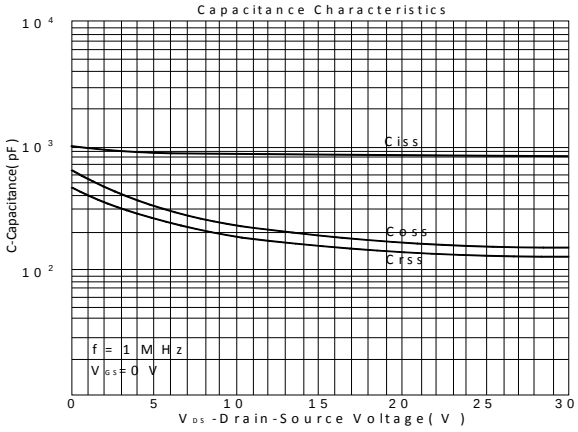



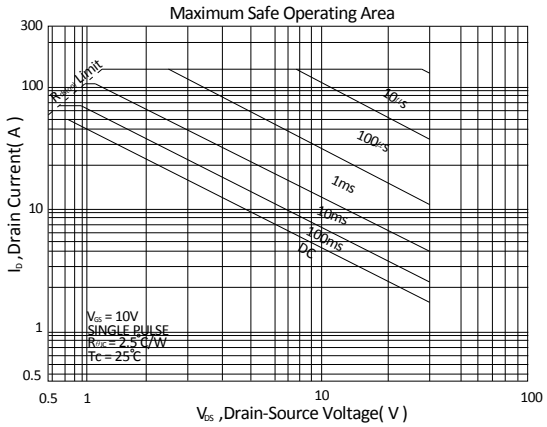



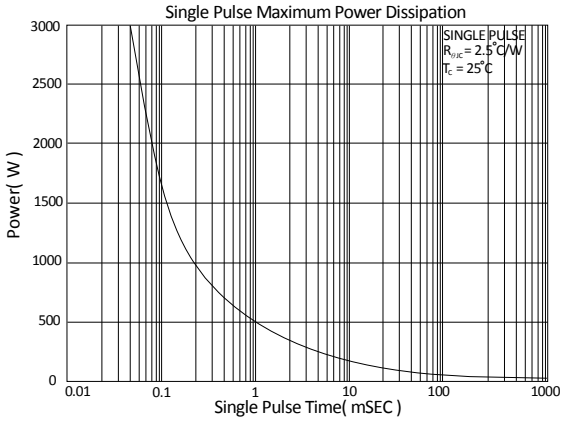



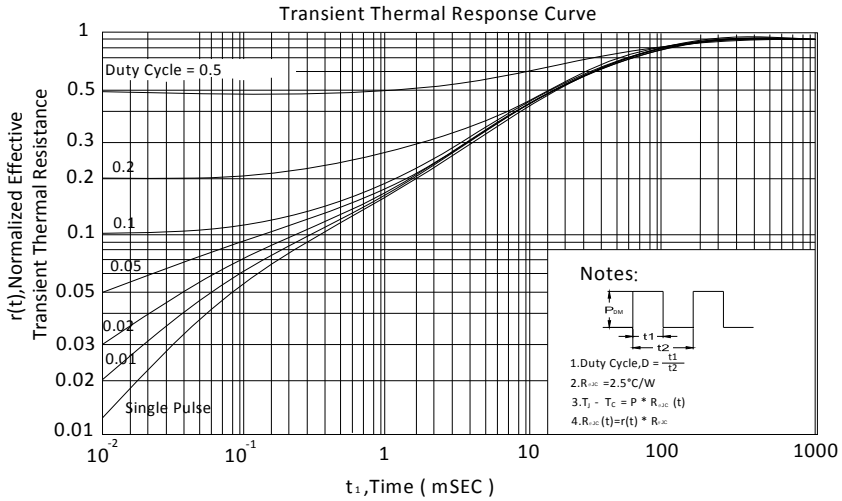




Gate Charge Characteristics
ID = 25A
VDS = 5V
10V
15V
VGS ,Gate-Source Voltage( V )
Qg ,Gate Charge( nC )


Capacitance Characteristics
Ciss
Coss
Crss
f = 1 MHz
VGS = 0 V
C-Capacitance( pF )
VDS -Drain-Source Voltage( V )


Maximum Safe Operating Area
RDS(ON) Limit
10μs
100μs
1ms
10ms
100ms
DC
VGS = 10V
SINGLE PULSE
RθJC = 2.5°C/W
TC = 25°C
ID ,Drain Current( A )
VDS ,Drain-Source Voltage( V )


Single Pulse Maximum Power Dissipation
SINGLE PULSE
RθJC = 2.5°C/W
TC = 25°C
Power( W )
Single Pulse Time( mSEC )


Transient Thermal Response Curve
Duty Cycle = 0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse
Notes:
1.Duty Cycle,D = t1/t2
2.RθJC =2.5°C/W
3.TJ - TC = P * RθJC (t)
4.RθJC (t)=r(t) * RθJC
r(t),Normalized Effective Transient Thermal Resistance
t1 ,Time ( mSEC )