

### General Description

It is mainly suitable for Load Switching Mobile Phones, Battery Powered Systems and Level-Shifter.

### FEATURES

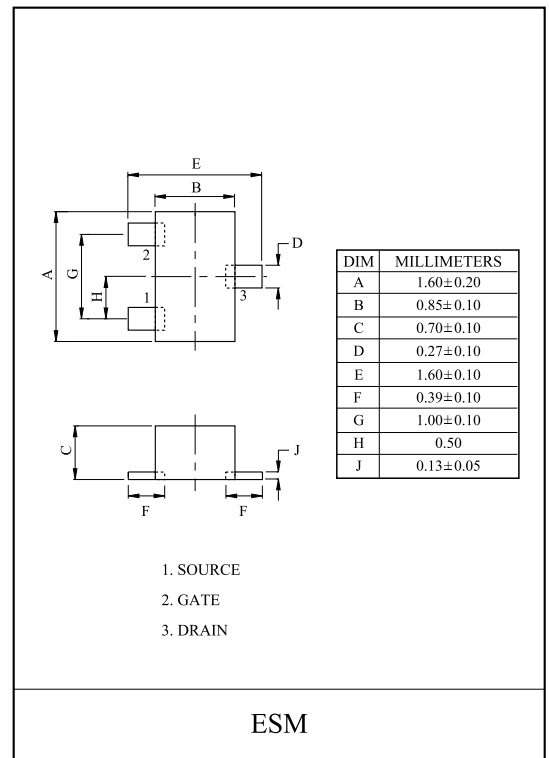
- $V_{DSS}=20V$ ,  $I_D=0.4A$
- Drain-Source ON Resistance
  - :  $R_{DS(ON)}=0.70$  @  $V_{GS}=4.5V$
  - :  $R_{DS(ON)}=0.85$  @  $V_{GS}=2.5V$
  - :  $R_{DS(ON)}=1.25$  @  $V_{GS}=1.8V$
- Super High Dense Cell Design

### MAXIMUM RATING (Ta=25 °C)

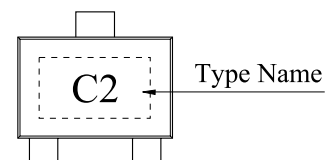
| CHARACTERISTIC                                   |                        | SYMBOL     | N-Ch    | UNIT |
|--|------------------------|------------|---------|------|
| Drain-Source Voltage                             |                        | $V_{DSS}$  | 20      | V    |
| Gate-Source Voltage                              |                        | $V_{GSS}$  | $\pm 6$ | V    |
| Drain Current                                    | DC @ $T_A=25$ (Note 1) | $I_D$      | 400     | mA   |
|  | DC @ $T_A=85$ (Note 1) |            | 330     |      |
|  | Pulsed (Note 1)        | $I_{DP}$   | 1600    |      |
| Drain Power Dissipation (Note 2)                 |                        | $P_D$      | 210     | mW   |
| Maximum Junction Temperature                     |                        | $T_j$      | 150     |      |
| Storage Temperature Range                        |                        | $T_{stg}$  | -55 150 |      |
| Thermal Resistance, Junction to Ambient (Note 2) |                        | $R_{thJA}$ | 600     | /W   |

Note 1) Drain current limited by maximum junction temperature.

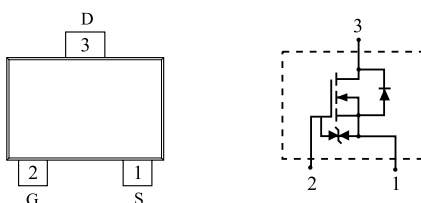
Note 2) Surface Mounted on 1" x 1" FR4 Board.



### Marking



### PIN CONNECTION (TOP VIEW)



# KML0D4N20E

## ELECTRICAL CHARACTERISTICS (Ta=25 °C)

| CHARACTERISTIC                     | SYMBOL         | TEST CONDITION  | MIN. | TYP. | MAX.      | UNIT    |
|------------------------------------|----------------|---|------|------|-----------|---------|
| <b>Static</b>                      |                |   |      |      |           |         |
| Drain-Source Breakdown Voltage     | $BV_{DSS}$     | $I_D=250\ \mu A, V_{GS}=0V$                           | 20   | -    | -         | V       |
| Drain Cut-off Current              | $I_{DSS}$      | $V_{GS}=0V, V_{DS}=20V$                               | -    | -    | 100       | nA      |
| Gate Leakage Current               | $I_{GSS}$      | $V_{GS}=\pm 4.5V, V_{DS}=0V$                          | -    | -    | $\pm 1.0$ | $\mu A$ |
| Gate Threshold Voltage             | $V_{th}$       | $V_{DS}=V_{GS}, I_D=250\ \mu A$                       | 0.45 | -    | 1.0       | V       |
| Drain-Source ON Resistance         | $R_{DS(ON)}^*$ | $V_{GS}=4.5V, I_D=400mA$ (Note 3)                     | -    | 0.41 | 0.70      |         |
|                                    |                | $V_{GS}=2.5V, I_D=350mA$ (Note 3)                     | -    | 0.53 | 0.85      |         |
|                                    |                | $V_{GS}=1.8V, I_D=300mA$ (Note 3)                     | -    | 0.70 | 1.25      |         |
| Forward Transconductance           | $g_{fs}^*$     | $V_{DS}=5V, I_D=400mA$ (Note 3)                       | -    | 1.0  | -         | S       |
| Source-Drain Diode Forward Voltage | $V_{SD}^*$     | $I_S=150mA, V_{GS}=0V$ (Note 3)                       | -    | 0.8  | 1.2       | V       |
| <b>Dynamic</b>                     |                |   |      |      |           |         |
| Total Gate Charge                  | $Q_g^*$        | $V_{DS}=10V, I_D=400mA, V_{GS}=4.5V$ (Note 3)         | -    | 555  | -         | pC      |
| Gate-Source Charge                 | $Q_{gs}^*$     |   | -    | 50   | -         |         |
| Gate-Drain Charge                  | $Q_{gd}^*$     |   | -    | 100  | -         |         |
| Turn-on Delay time                 | $t_{d(on)}^*$  | $V_{DD}=10V, I_D=400mA, V_{GS}=4.5V, R_G=10$ (Note 3) | -    | 5    | -         | ns      |
| Turn-on Rise time                  | $t_r$          |   | -    | 3    | -         |         |
| Turn-off Delay time                | $t_{d(off)}^*$ |   | -    | 13   | -         |         |
| Turn-off Fall time                 | $t_f$          |   | -    | 7    | -         |         |
| Input Capacitance                  | $C_{iss}$      | $V_{DS}=10V, V_{GS}=0V, f=1.0MHz$                     | -    | 43   | -         | pF      |
| Output Capacitance                 | $C_{oss}$      |   | -    | 15   | -         |         |
| Reverse Transfer Capacitance       | $C_{rss}$      |   | -    | 6    | -         |         |

Note 3) \*Pulse test : Pulse width 300 $\mu s$ , Duty Cycle 2%.

# KML0D4N20E

Fig 1.  $I_D - V_{DS}$

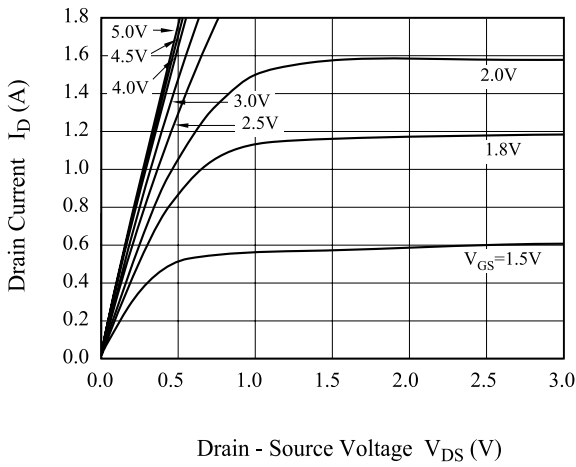


Fig 2.  $R_{DS(on)} - I_D$

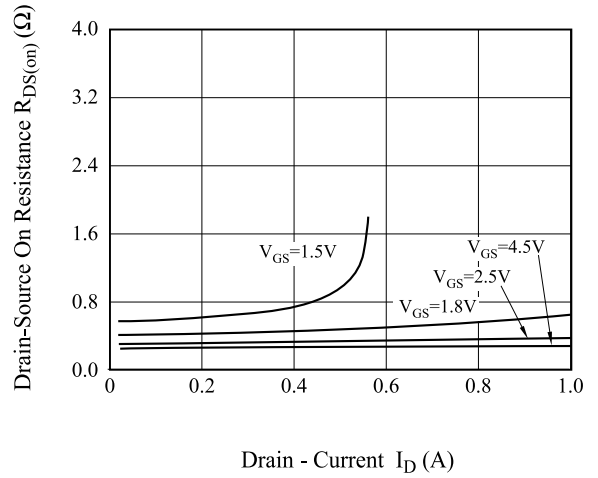


Fig 3.  $I_D - V_{GS}$

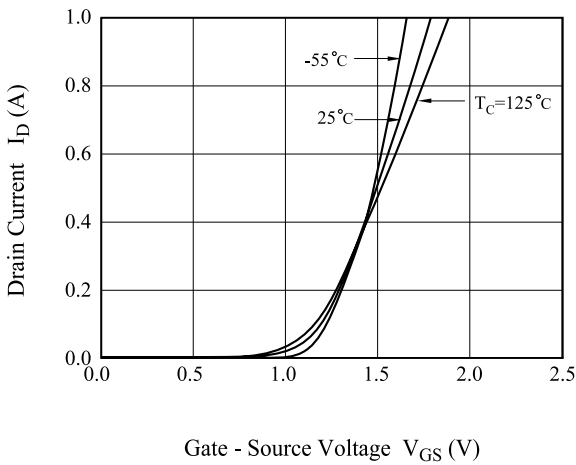


Fig 4.  $R_{DS(ON)} - T_j$

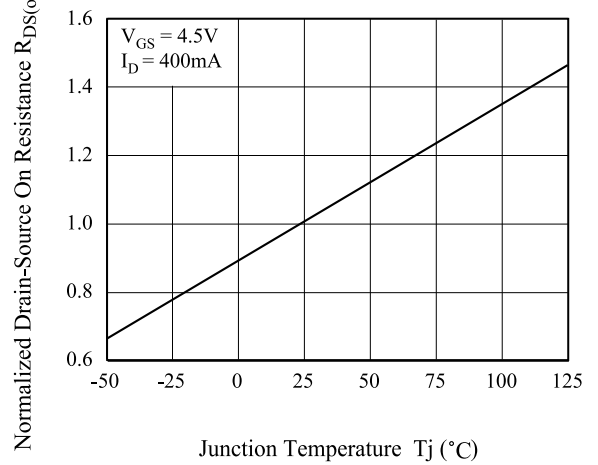


Fig 5.  $V_{th} - T_j$

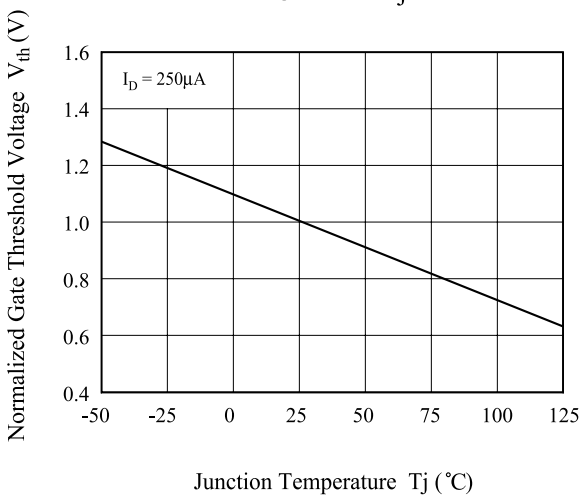
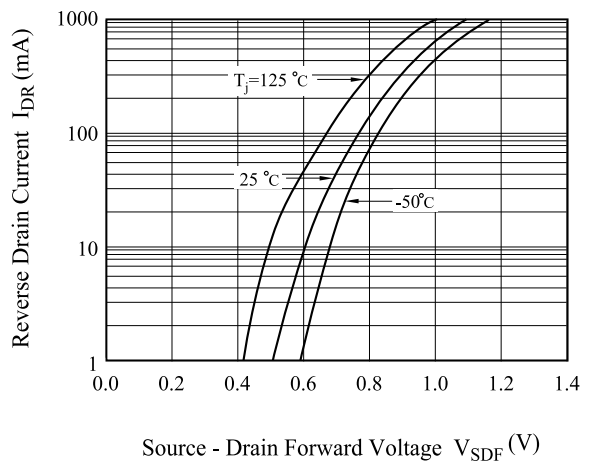


Fig 6.  $I_{DR} - V_{SDF}$



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Fig 7.  $V_{GS} - Q_g$

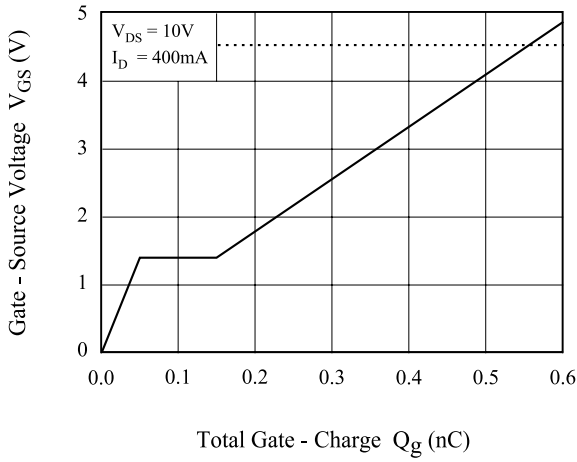


Fig 8.  $C - V_{DS}$

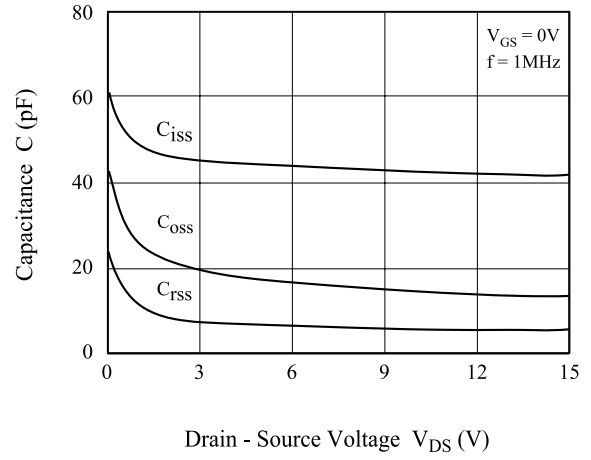


Fig 9. Transient Thermal Response Curve

