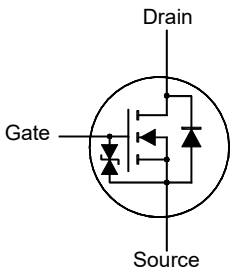
# MU10N480LK

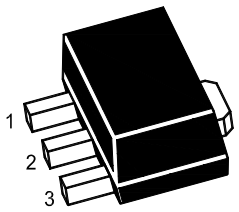
## N-Channel Enhancement Mode MOSFET

### Features

- Surface-mounted package
- Advanced trench cell design
- Built-in G-S Protection Diode
- Typical ESD Protection HBM Class 1C

| Classification | Voltage Range(V) |
|---|---|
| 0A | < 125 |
| 0B | 125 to < 250 |
| 1A | 250 to < 500 |
| 1B | 500 to < 1000 |
| 1C | 1000 to < 2000 |
| 2 | 2000 to < 4000 |
| 3A | 4000 to < 8000 |
| 3B | ≥ 8000 |




1.Gate 2.Drain 3.Source
SOT-89 Plastic Package

### Applications

- Portable appliances
- Battery management
- High speed switch
- Low power DC to DC Converter

### Absolute Maximum Ratings (at $T_a$ = 25℃ unless otherwise specified)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 100 | V |
| Gate-Source Voltage | $V_{GS}$ | ± 20 | V |
| Drain Current | $I_D$ | 2 | A |
| Peak Drain Current, Pulsed [1] | $I_{DM}$ | 8 | A |
| Power Dissipation [2] | $P_D$ | 1.5 | W |
| Max Operating Junction Temperature | $T_J$ | 150 | ℃ |
| Storage Temperature Range | $T_{stg}$ | - 55 to + 150 | ℃ |

### Thermal Resistance Ratings

| Parameter | Symbol | Max. | Unit |
|---|---|---|---|
| Thermal Resistance from Junction to Ambient [2] | $R_{\theta JA}$ | 83 | ℃/W |

[1] Pulse Test: Pulse Width ≤ 100 μs, Duty Cycle ≤ 2%,Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C.

[2] Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate in still air.



Dated: 13/09/2023 Rev:02

**Characteristics at $T_a$ = 25℃ unless otherwise specified**

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| **STATIC PARAMETERS** | | | | | |
| Drain-Source Breakdown Voltage<br>at $I_D$ = 250 µA | $V_{(BR)DSS}$ | 100 | - | - | V |
| Zero Gate Voltage Drain Current<br>at $V_{DS}$ = 80 V | $I_{DSS}$ | - | - | 1 | µA |
| Gate-Source Leakage<br>at $V_{GS}$ = ± 20 V | $I_{GSS}$ | - | - | ± 10 | µA |
| Gate-Source Threshold Voltage<br>at $V_{GS}$ = $V_{DS}$, $I_D$ = 250 µA | $V_{GS(th)}$ | 1 | - | 2.5 | V |
| Drain-Source On-State Resistance<br>at $V_{GS}$ = 10 V, $I_D$ = 2 A<br>at $V_{GS}$ = 4.5 V, $I_D$ = 0.5 A | $R_{DS(on)}$ | -<br>- | -<br>- | 440<br>480 | mΩ |
| **DYNAMIC PARAMETERS** | | | | | |
| Forward Transconductance<br>at $V_{DS}$ = 10 V, $I_D$ = 1 A | $g_{Fs}$ | - | 3 | - | S |
| Input Capacitance<br>at $V_{DS}$ = 30 V, $V_{GS}$ = 0 V, f = 1 MHz | $C_{iss}$ | - | 438 | - | pF |
| Output Capacitance<br>at $V_{DS}$ = 30 V, $V_{GS}$ = 0 V, f = 1 MHz | $C_{oss}$ | - | 15 | - | pF |
| Reverse Transfer Capacitance<br>at $V_{DS}$ = 30 V, $V_{GS}$ = 0 V, f = 1 MHz | $C_{rss}$ | - | 11 | - | pF |
| Total Gate Charge<br>at $V_{DS}$ = 50 V, $I_D$ = 1 A, $V_{GS}$ = 10 V<br>at $V_{DS}$ = 50 V, $I_D$ = 1 A, $V_{GS}$ = 4.5 V | $Q_g$ | -<br>- | 9.5<br>4.2 | -<br>- | nC |
| Gate to Source Charge<br>at $V_{DS}$ = 50 V, $I_D$ = 1 A, $V_{GS}$ = 10 V | $Q_{gs}$ | - | 1.9 | - | nC |
| Gate to Drain Charge<br>at $V_{DS}$ = 50 V, $I_D$ = 1 A, $V_{GS}$ = 10 V | $Q_{gd}$ | - | 1.2 | - | nC |
| Turn-On Delay Time<br>at $V_{DS}$ = 50 V, $I_D$ = 1 A, $V_{GS}$ = 10 V, $R_G$ = 3.9 Ω | $t_{d(on)}$ | - | 3.9 | - | ns |
| Turn-On Rise Time<br>at $V_{DS}$ = 50 V, $I_D$ = 1 A, $V_{GS}$ = 10 V, $R_G$ = 3.9 Ω | $t_r$ | - | 2.5 | - | ns |
| Turn-Off Delay Time<br>at $V_{DS}$ = 50 V, $I_D$ = 1 A, $V_{GS}$ = 10 V, $R_G$ = 3.9 Ω | $t_{d(off)}$ | - | 15.7 | - | ns |
| Turn-Off Fall Time<br>at $V_{DS}$ = 50 V, $I_D$ = 1 A, $V_{GS}$ = 10 V, $R_G$ = 3.9 Ω | $t_f$ | - | 15.2 | - | ns |
| **Body-Diode PARAMETERS** | | | | | |
| Drain-Source Diode Forward Voltage<br>at $V_{GS}$ = 0 V, $I_S$ = 1 A | $V_{SD}$ | - | - | 1.2 | V |
| Body-Diode Continuous Current | $I_S$ | - | - | 2 | A |
| Body Diode Reverse Recovery Time<br>at $I_S$ = 1 A, di/dt = 100 A / µs | $t_{rr}$ | - | 15 | - | ns |
| Body Diode Reverse Recovery Charge<br>at $I_S$ = 1 A, di/dt = 100 A / µs | $Q_{rr}$ | - | 10 | - | nC |

## Electrical Characteristics Curves

Fig. 1 Typical Output Characteristics

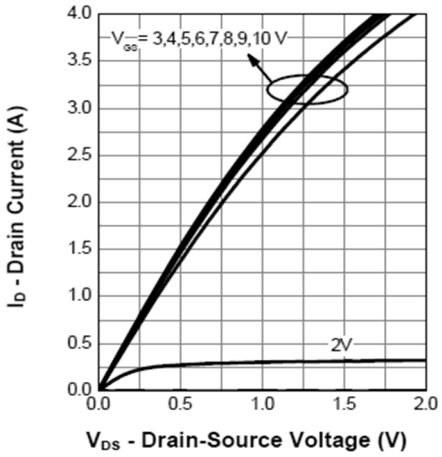



Fig. 2 on-Resistance vs. Gate-Source Voltage

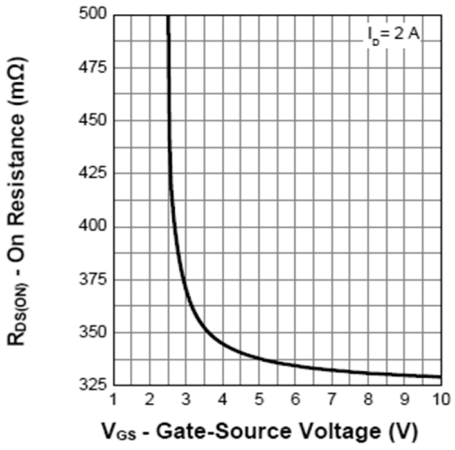



Fig. 3 On-Resistance vs. Drain Current

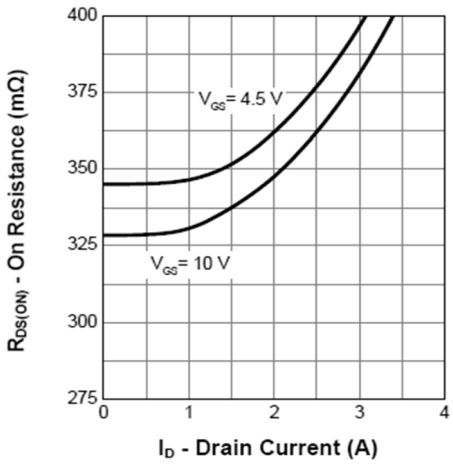



Fig. 4 Gate Threshold Variation vs. $T_j$

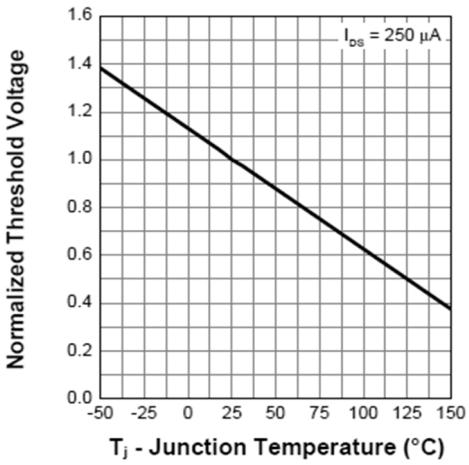



Fig. 5 on-Resistance vs.$T_j$

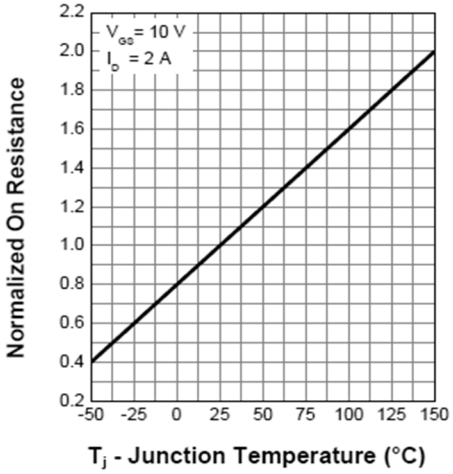
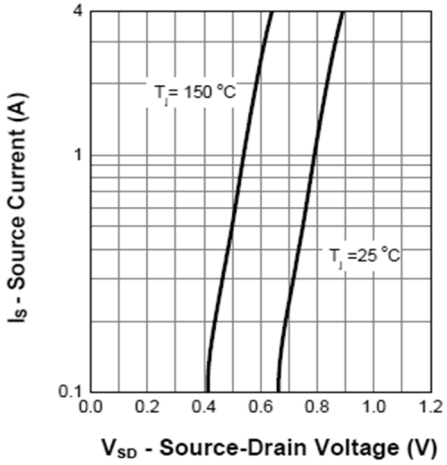



Fig. 6 Typical Forward Characteristics



## Electrical Characteristics Curves

Fig. 7 Typical Junction Capacitance

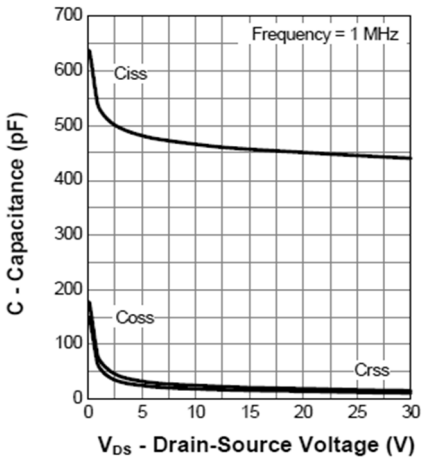
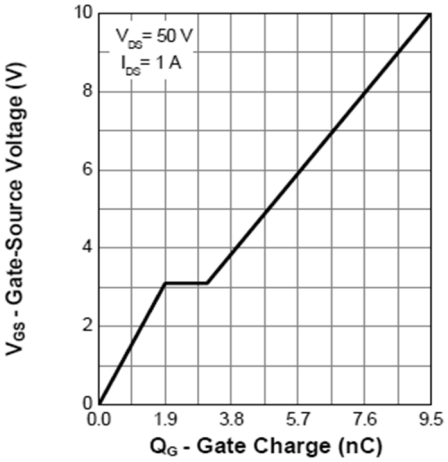



Fig. 8 Gate Charge



**Test Circuits**

Fig.1-1 Switching times test circuit

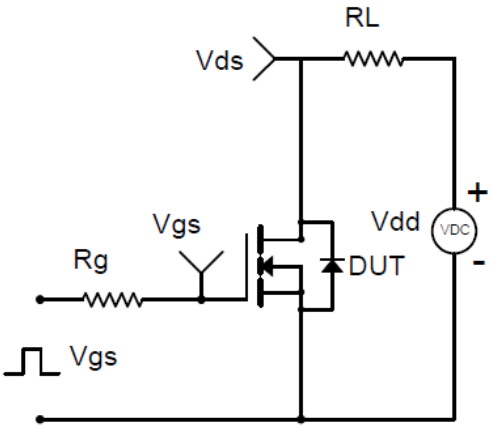



Fig.1-2 Switching Waveform

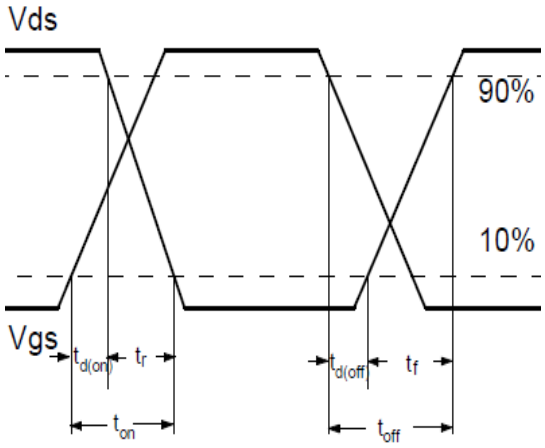



Fig.2-1 Gate charge test circuit

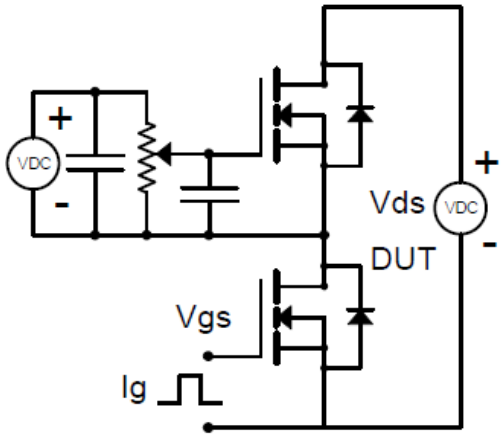
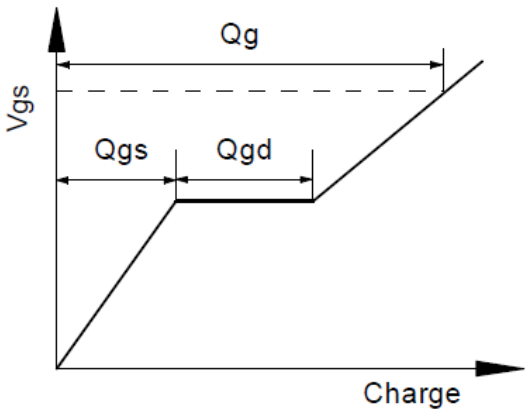
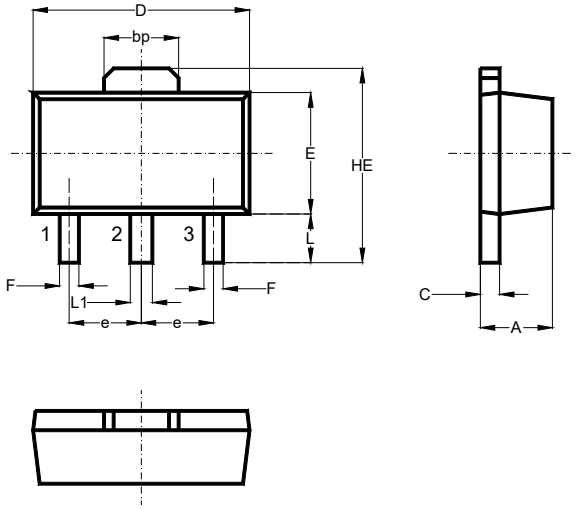



Fig.2-2 Gate charge waveform

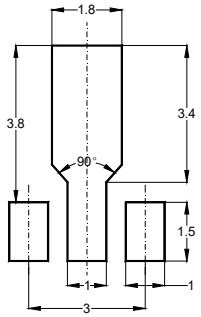


## Package Outline (Dimensions in mm) SOT-89




| Unit | A | bp | C | D | E | F | HE | e | L | L1 |
|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.6<br>1.4 | 1.60<br>1.50 | 0.5<br>0.3 | 4.6<br>4.4 | 2.6<br>2.4 | 0.45<br>0.35 | 4.25<br>3.75 | 1.5<br>typ. | 1.05<br>0.95 | 0.51<br>0.41 |

### Recommended Soldering Footprint

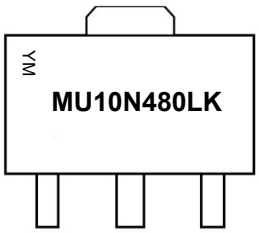



### Packing information

| Package | Tape Width (mm) | Pitch | | Reel Size | | Per Reel Packing Quantity |
|---|---|---|---|---|---|---|
| | | mm | inch | mm | inch | |
| SOT-89 | 12 | 8 ± 0.1 | 0.315 ± 0.004 | 178 | 7 | 1,000 |
| | | | | 330 | 13 | 4,000 |

### Marking information

" MU10N480LK " = Part No.
" YM " = Date Code Marking
" Y " = Year
" M " = Month
Font type: Arial








Dated: 13/09/2023 Rev:02