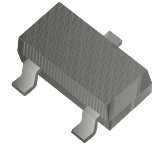


## N-Channel MOSFET

RoHS Device

Halogen Free



### Features

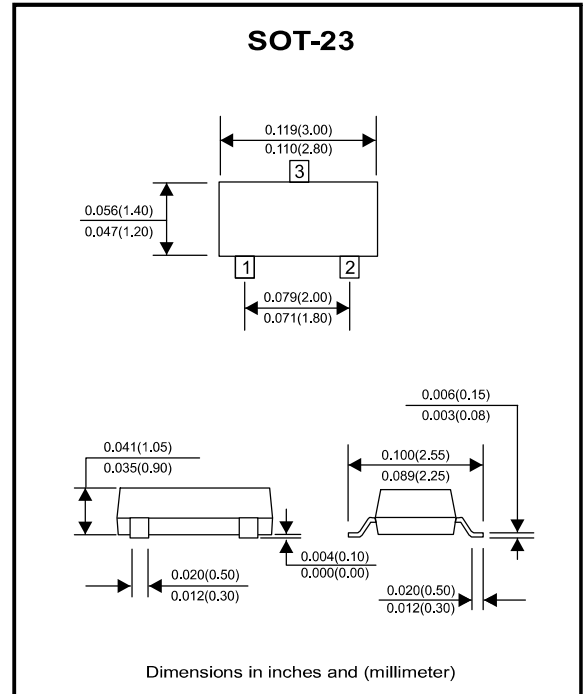
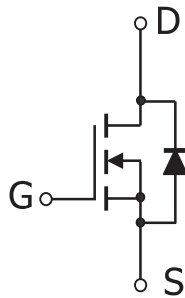
- $V_{DS}=100V$ ,  $I_D=3A$   
 $R_{DS(ON)}=110m\Omega$  @  $V_{GS} = 10V$   
 $R_{DS(ON)}=160m\Omega$  @  $V_{GS} = 4.5V$
- High Power and Current Handling Capability
- Lead Free Product is Acquired
- Surface Mount Package

### Application

- Battery Protection
- Load Switch
- Power Management

### Circuit Diagram

- G : Gate
- S : Source
- D : Drain



### Maximum Ratings (at $T_a=25^\circ C$ unless otherwise noted)

| Symbol          | Parameter                               |                     | Max.        | Units        |
|-----------------|-----------------------------------------|---------------------|-------------|--------------|
| $V_{DSS}$       | Drain-Source Voltage                    |                     | 100         | V            |
| $V_{GSS}$       | Gate-Source Voltage                     |                     | $\pm 20$    | V            |
| $I_D$           | Continuous Drain Current                | $T_C = 25^\circ C$  | 3           | A            |
|                 |                                         | $T_C = 100^\circ C$ | 2.4         |              |
| $I_{DM}$        | Pulsed Drain Current <sup>note1</sup>   |                     | 12          | A            |
| $P_D$           | Power Dissipation                       | $T_C = 25^\circ C$  | 1.2         | W            |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient |                     | 104         | $^\circ C/W$ |
| $T_J, T_{STG}$  | Operating and Storage Temperature Range |                     | -55 to +150 | $^\circ C$   |

**Electrical Characteristics** ( $T_C=25^{\circ}\text{C}$  unless otherwise specified)

| Symbol                                                 | Parameter                                                 | Test Condition                                                                            | Min. | Typ. | Max. | Units |
|--------------------------------------------------------|-----------------------------------------------------------|-------------------------------------------------------------------------------------------|------|------|------|-------|
| Off Characteristic                                     |                                                           |                                                                                           |      |      |      |       |
| V <sub>(BR)DSS</sub>                                   | Drain-Source Breakdown Voltage                            | V <sub>GS</sub> =0V,I <sub>D</sub> = 250μA                                                | 100  | -    | -    | V     |
| I <sub>DSS</sub>                                       | Zero Gate Voltage Drain Current                           | V <sub>DS</sub> =100V, V <sub>GS</sub> = 0V,                                              | -    | -    | 1    | μA    |
| I <sub>GSS</sub>                                       | Gate to Body Leakage Current                              | V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V                                               | -    | -    | ±100 | nA    |
| On Characteristics                                     |                                                           |                                                                                           |      |      |      |       |
| V <sub>GS(th)</sub>                                    | Gate Threshold Voltage                                    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                | 1.0  | 1.8  | 3.0  | V     |
| R <sub>DS(on)</sub>                                    | Static Drain-Source on-Resistance<br><small>note2</small> | V <sub>GS</sub> =10V, I <sub>D</sub> =3A                                                  | -    | 110  | 140  | mΩ    |
|                                                        |                                                           | V <sub>GS</sub> =4.5V, I <sub>D</sub> =2A                                                 | -    | 160  | 300  |       |
| Dynamic Characteristics                                |                                                           |                                                                                           |      |      |      |       |
| C <sub>iss</sub>                                       | Input Capacitance                                         | V <sub>DS</sub> =50V, V <sub>GS</sub> = 0V,<br>f = 1.0MHz                                 | -    | 206  | -    | pF    |
| C <sub>oss</sub>                                       | Output Capacitance                                        |                                                                                           | -    | 29   | -    | pF    |
| C <sub>rss</sub>                                       | Reverse Transfer Capacitance                              |                                                                                           | -    | 1.4  | -    | pF    |
| Q <sub>g</sub>                                         | Total Gate Charge                                         | V <sub>DS</sub> =50V, I <sub>D</sub> =3A,<br>V <sub>GS</sub> =10V                         | -    | 4.3  | -    | nC    |
| Q <sub>gs</sub>                                        | Gate-Source Charge                                        |                                                                                           | -    | 1.5  | -    | nC    |
| Q <sub>gd</sub>                                        | Gate-Drain(“Miller”) Charge                               |                                                                                           | -    | 1.1  | -    | nC    |
| Switching Characteristics                              |                                                           |                                                                                           |      |      |      |       |
| t <sub>d(on)</sub>                                     | Turn-on Delay Time                                        | V <sub>DD</sub> =50V, I <sub>D</sub> =3A,<br>R <sub>GEN</sub> = 2Ω, V <sub>GS</sub> =10V, | -    | 14.7 | -    | ns    |
| t <sub>r</sub>                                         | Turn-on Rise Time                                         |                                                                                           | -    | 3.5  | -    | ns    |
| t <sub>d(off)</sub>                                    | Turn-off Delay Time                                       |                                                                                           | -    | 20.9 | -    | ns    |
| t <sub>f</sub>                                         | Turn-off Fall Time                                        |                                                                                           | -    | 2.7  | -    | ns    |
| Drain-Source Diode Characteristics and Maximum Ratings |                                                           |                                                                                           |      |      |      |       |
| I <sub>S</sub>                                         | Maximum Continuous Drain to Source Diode Forward Current  |                                                                                           | -    | -    | 3    | A     |
| I <sub>SM</sub>                                        | Maximum Pulsed Drain to Source Diode Forward Current      |                                                                                           | -    | -    | 12   | A     |
| t <sub>rr</sub>                                        | Reverse recovery time                                     | I <sub>S</sub> =3A,di/dt=100 A/μs                                                         | -    | 32   | -    | ns    |
| Q <sub>rr</sub>                                        | Reverse recovery charge                                   |                                                                                           | -    | 39   | -    | nC    |

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 2\%$

## Typical Performance Characteristics

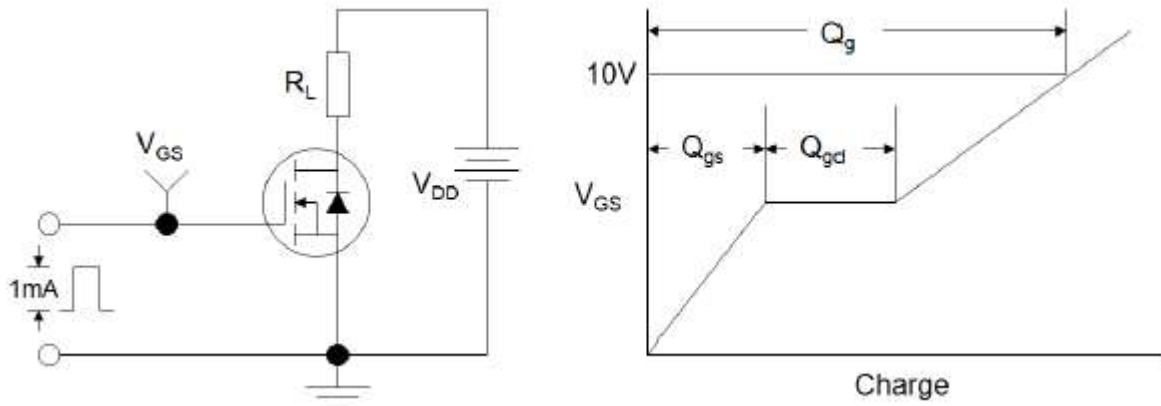


Figure1:Gate Charge Test Circuit & Waveform

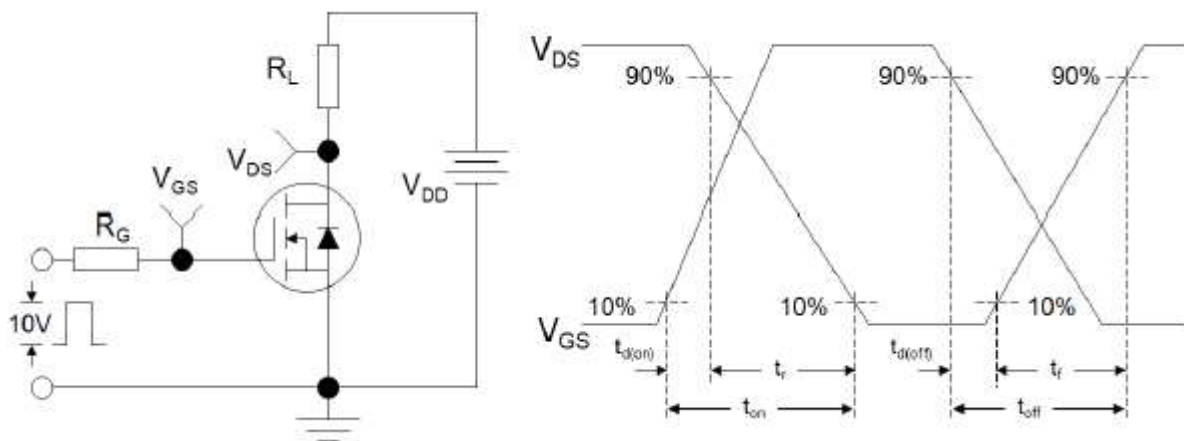


Figure 2: Resistive Switching Test Circuit & Waveforms

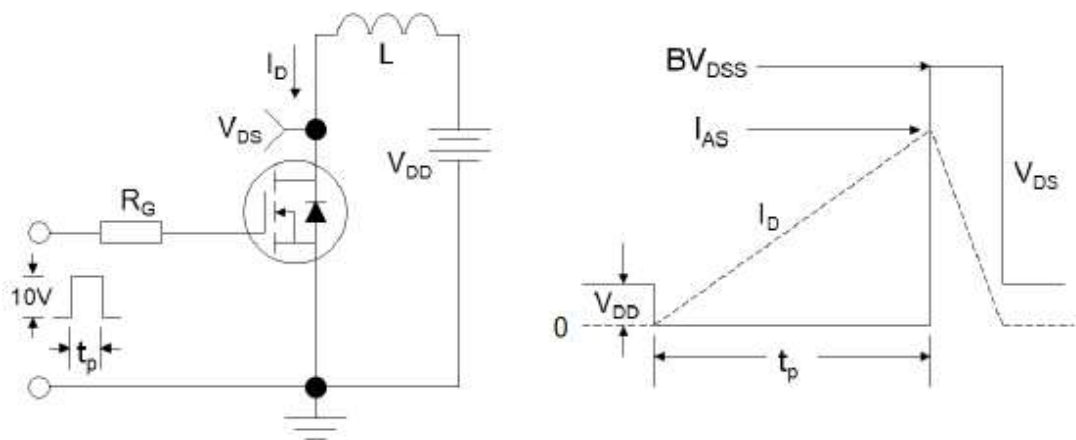


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

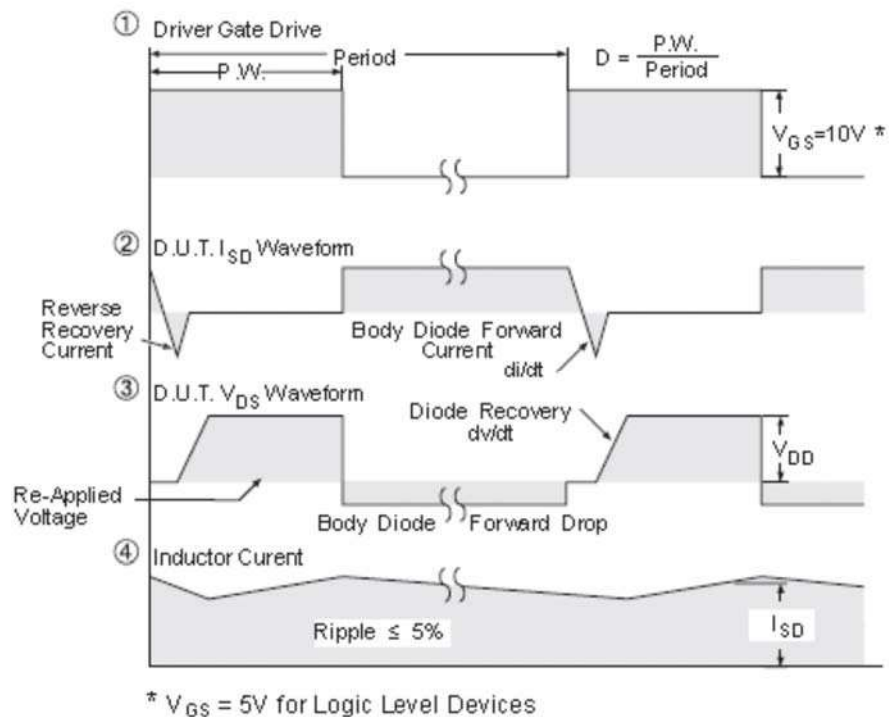
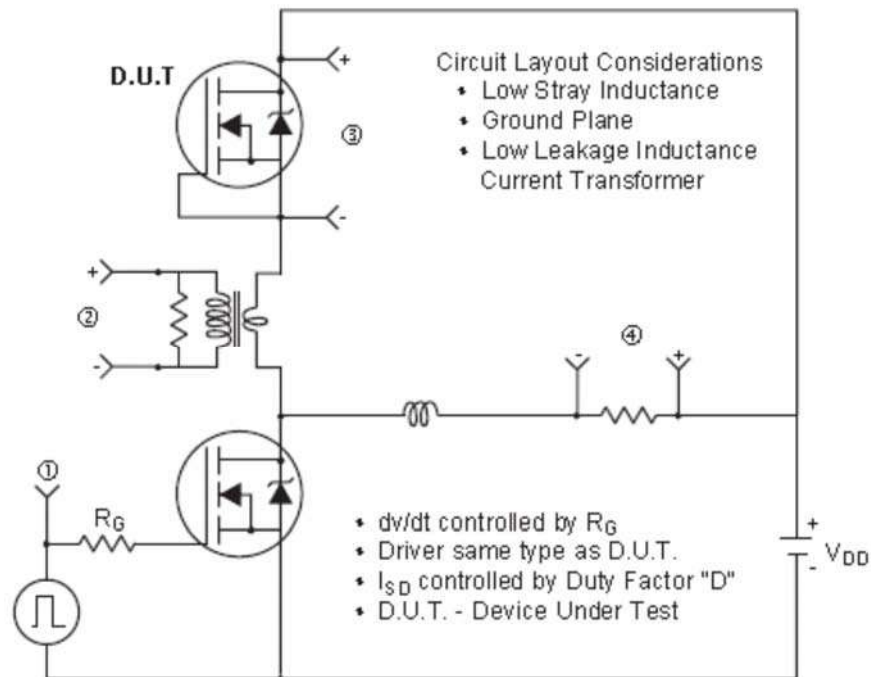
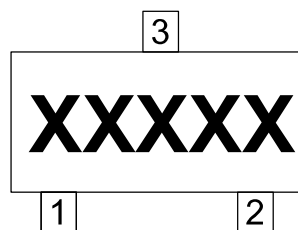


Figure 4: Peak Diode Recovery  $dv/dt$  Test Circuit & Waveforms (For N-channel)

## Marking Code

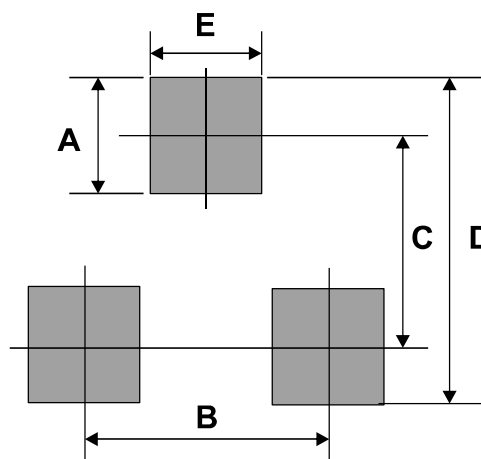
| Part Number | Marking Code |
|-------------|--------------|
| LM3V10A     | 3V10A        |



xxxxx = Product type marking code

## Suggested PAD Layout

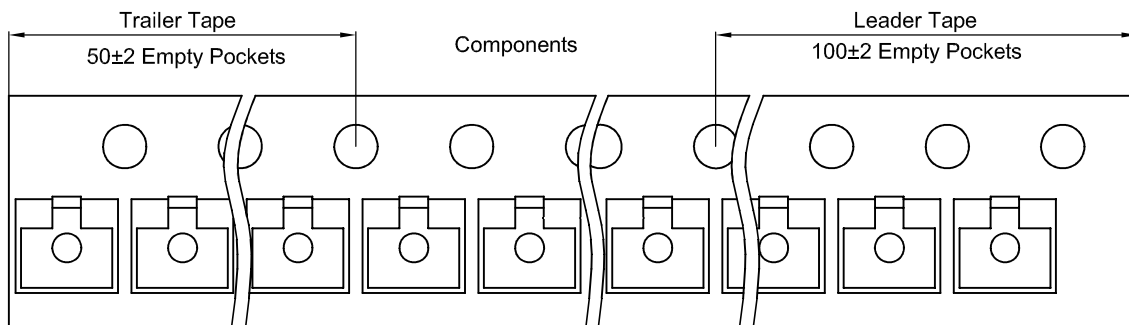
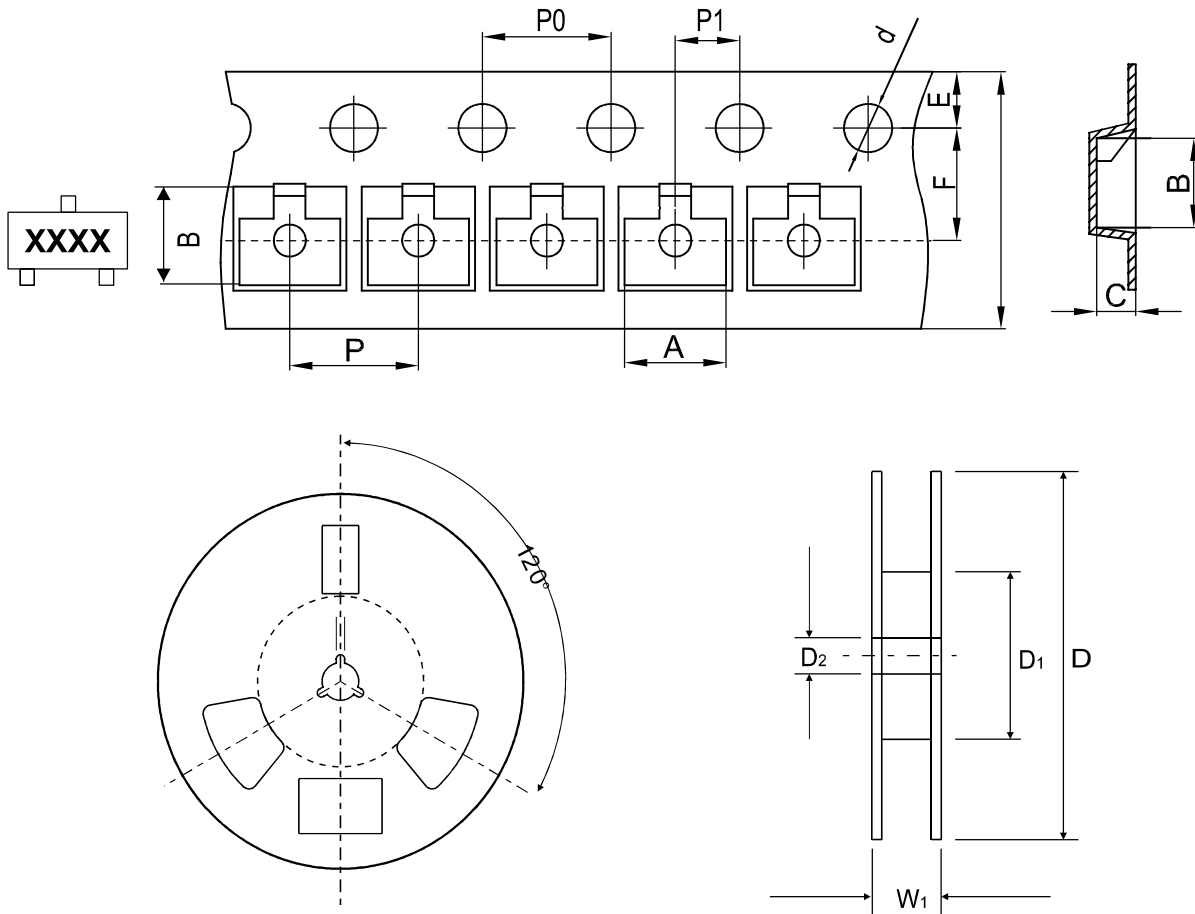
| SIZE | SOT-23 |        |
|------|--------|--------|
|      | (mm)   | (inch) |
| A    | 0.80   | 0.031  |
| B    | 1.90   | 0.075  |
| C    | 2.02   | 0.080  |
| D    | 2.82   | 0.111  |
| E    | 0.60   | 0.024  |



## Standard Packaging

| Case Type | Qty Per Reel | Reel Size |
|-----------|--------------|-----------|
|           | (Pcs)        | (inch)    |
| SOT-23    | 3,000        | 7         |

## Reel Taping Specification



| SOT-23 | SYMBOL | A                 | B                 | C                 | d                 | D                 | D1                | D2                |
|--------|--------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
|        | (mm)   | $3.15 \pm 0.10$   | $2.77 \pm 0.10$   | $1.22 \pm 0.10$   | $1.50 \pm 0.10$   | $178.00 \pm 2.00$ | $54.40 \pm 1.00$  | $13.00 \pm 1.00$  |
|        | (inch) | $0.124 \pm 0.004$ | $0.109 \pm 0.004$ | $0.048 \pm 0.004$ | $0.059 \pm 0.004$ | $7.008 \pm 0.079$ | $2.142 \pm 0.039$ | $0.512 \pm 0.039$ |

| SOT-23 | SYMBOL | E                 | F                 | P                 | P0                | P1                | W                         | W1                |
|--------|--------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------------------|-------------------|
|        | (mm)   | $1.75 \pm 0.10$   | $3.50 \pm 0.10$   | $4.00 \pm 0.10$   | $4.00 \pm 0.10$   | $2.00 \pm 0.10$   | $8.00 + 0.30 / - 0.10$    | $12.30 \pm 1.00$  |
|        | (inch) | $0.069 \pm 0.004$ | $0.138 \pm 0.004$ | $0.157 \pm 0.004$ | $0.157 \pm 0.004$ | $0.079 \pm 0.004$ | $0.315 + 0.012 / - 0.004$ | $0.484 \pm 0.039$ |

Company reserves the right to improve product design , functions and reliability without notice.