

### Product Summary

| Part #   | $V_{DS}$ | $R_{DS(on).typ}$<br>(@ $V_{GS}=10V$ ) | $R_{DS(on).typ}$<br>(@ $V_{GS}=4.5V$ ) | $I_D$ |
|----------|----------|---------------------------------------|----------------------------------------|-------|
| EFM3453A | -30V     | 80m $\Omega$                          | 90m $\Omega$                           | -2.6A |

### Features

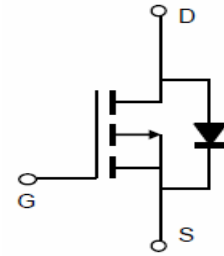
- Low  $R_{DS(on)}$  @  $V_{GS}=-10V$
- - 4.5V Logic Level Control
- P Channel SOT23-3L Package
- Pb-Free, RoHS Compliant

### Application

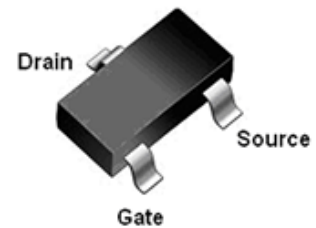
- Notebook
- Load Switch
- Battery Protection
- Hand-Held Instruments

### Ordering Information:

|                           |           |
|---------------------------|-----------|
| Part NO.                  | EFM3453A  |
| Marking                   | BS****    |
| Packing Information       | REEL TAPE |
| Basic ordering unit (pcs) | 3000      |



P-Channel MOSFET



SOT23-3L



### Absolute Maximum Ratings ( $T_C=25^{\circ}C$ )

| Parameter                                        | Symbol         | Limit      | Unit        |
|--------------------------------------------------|----------------|------------|-------------|
| Drain-Source Voltage                             | $V_{DS}$       | -30        | V           |
| Gate-Source Voltage                              | $V_{GS}$       | $\pm 12$   | V           |
| Drain Current-Continuous                         | $I_D$          | -2.6       | A           |
| Drain Current-Pulsed <sup>(Note 1)</sup>         | $I_{DM}$       | -13        | A           |
| Maximum Power Dissipation                        | $P_D$          | 1.4        | W           |
| Operating Junction and Storage Temperature Range | $T_J, T_{STG}$ | -55 To 150 | $^{\circ}C$ |

### Thermal Characteristic

|                                                             |                 |     |               |
|-------------------------------------------------------------|-----------------|-----|---------------|
| Thermal Resistance, Junction-to-Ambient <sup>(Note 2)</sup> | $R_{\theta JA}$ | 100 | $^{\circ}C/W$ |
|-------------------------------------------------------------|-----------------|-----|---------------|

• Static Electrical Characteristics @  $T_J = 25^{\circ}\text{C}$  (unless otherwise stated)

| Parameter                                     | Symbol       | Condition                                                  | Min  | Typ   | Max       | Unit       |
|-----------------------------------------------|--------------|------------------------------------------------------------|------|-------|-----------|------------|
| Off Characteristics                           |              |                                                            |      |       |           |            |
| Drain-Source Breakdown Voltage                | $BV_{DSS}$   | $V_{GS}=0V$ $I_D=-250\mu A$                                | -30  | --    | --        | V          |
| Zero Gate Voltage Drain Current               | $I_{DSS}$    | $V_{DS}=-30V$ $V_{GS}=0V$                                  | --   | --    | -1        | $\mu A$    |
| Gate-Body Leakage Current                     | $I_{GSS}$    | $V_{GS}=\pm 12V$ $V_{DS}=0V$                               | --   | --    | $\pm 100$ | nA         |
| On Characteristics <sup>(Note 3)</sup>        |              |                                                            |      |       |           |            |
| Gate Threshold Voltage                        | $V_{GS(th)}$ | $V_{DS}=V_{GS}$ $I_D=-250\mu A$                            | -0.5 | -0.8  | -1.5      | V          |
| Drain-Source On-State Resistance              | $R_{DS(ON)}$ | $V_{GS}=-10V$ $I_D=-2.6A$                                  | --   | 80    | 88        | m $\Omega$ |
|                                               |              | $V_{GS}=-4.5V$ $I_D=-2A$                                   | --   | 90    | 100       | m $\Omega$ |
| Dynamic Characteristics <sup>(Note4)</sup>    |              |                                                            |      |       |           |            |
| Input Capacitance                             | $C_{ISS}$    | $V_{DS}=-15V$ $V_{GS}=0V$<br><br>$F=1.0MHz$                | --   | 260   | --        | PF         |
| Output Capacitance                            | $C_{OSS}$    |                                                            | --   | 37    | --        | PF         |
| Reverse Transfer Capacitance                  | $C_{RSS}$    |                                                            | --   | 20    | --        | PF         |
| Switching Characteristics <sup>(Note 4)</sup> |              |                                                            |      |       |           |            |
| Turn-on Delay Time                            | $t_{d(on)}$  | $V_{DD}=-15V$ $I_D=-2.6A$<br>$V_{GS}=-10V$ $R_G=3\Omega$ , | --   | 6     | --        | nS         |
| Turn-on Rise Time                             | $t_r$        |                                                            | --   | 3.5   | --        | nS         |
| Turn-Off Delay Time                           | $t_{d(off)}$ |                                                            | --   | 20    | --        | nS         |
| Turn-Off Fall Time                            | $t_f$        |                                                            | --   | 5     | --        | nS         |
| Total Gate Charge                             | $Q_g$        | $V_{DS}=-15V$ $I_D=-2.6A$<br><br>$V_{GS}=-10V$             | --   | 6     | --        | nC         |
| Gate-Source Charge                            | $Q_{gs}$     |                                                            | --   | 0.7   | --        | nC         |
| Gate-Drain Charge                             | $Q_{gd}$     |                                                            | --   | 1     | --        | nC         |
| Drain-Source Diode Characteristics            |              |                                                            |      |       |           |            |
| Diode Forward Voltage <sup>(Note 3)</sup>     | $V_{SD}$     | $V_{GS}=0V$ $I_S=-2.6A$                                    | --   | -0.84 | -1.2      | V          |
| Diode Forward Current <sup>(Note 2)</sup>     | $I_S$        |                                                            | --   | --    | -2.6      | A          |

Notes:

- ① Pulse width limited by maximum allowable junction temperature  
 ② Pulse test ; Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .

## • Typical Characteristics

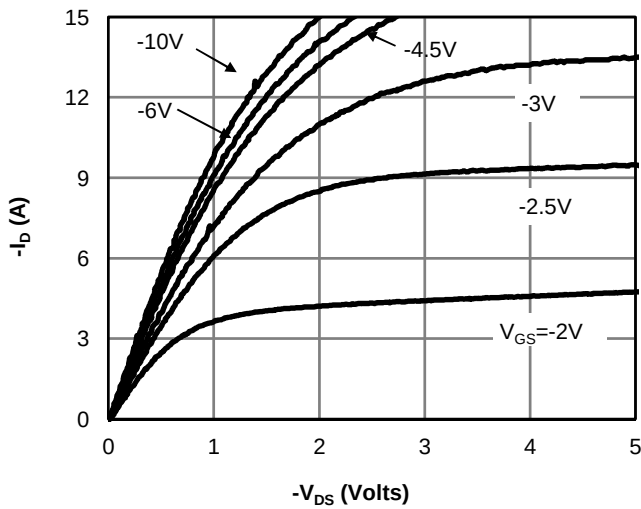


Fig 1: On-Region Characteristics (Note E)

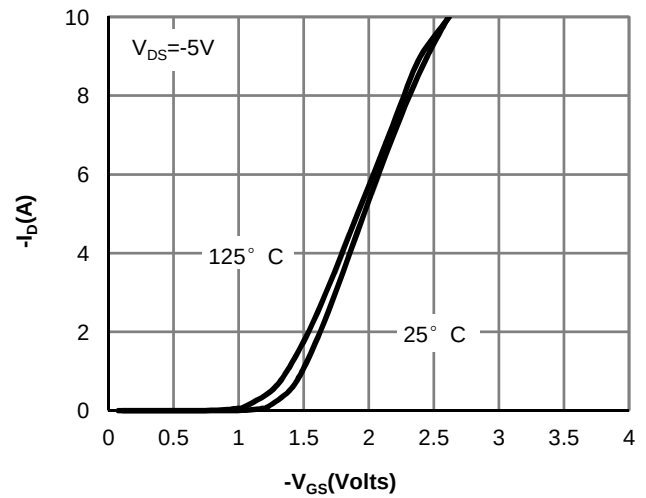


Figure 2: Transfer Characteristics (Note E)

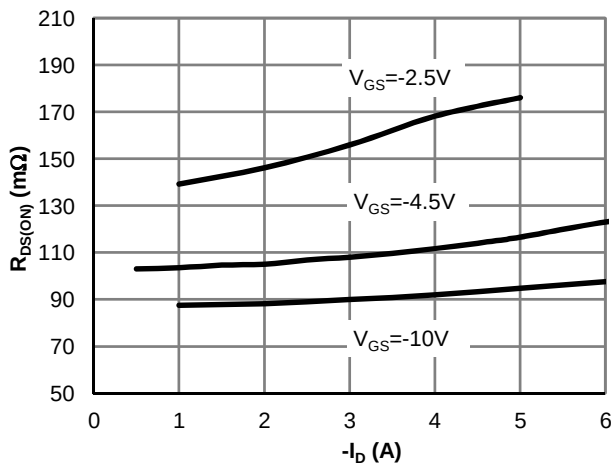


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

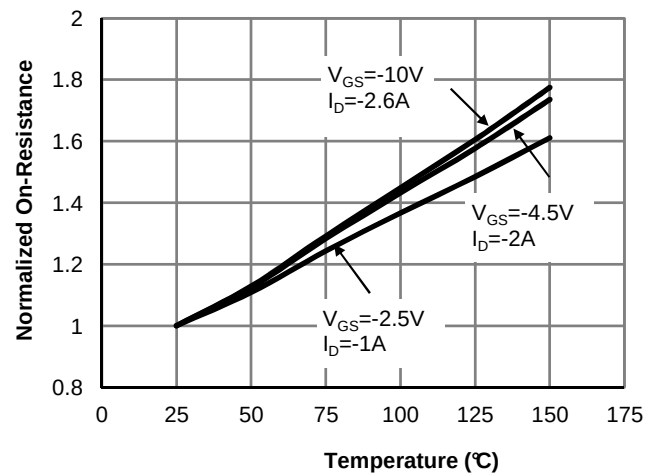


Figure 4: On-Resistance vs. Junction Temperature (Note E)

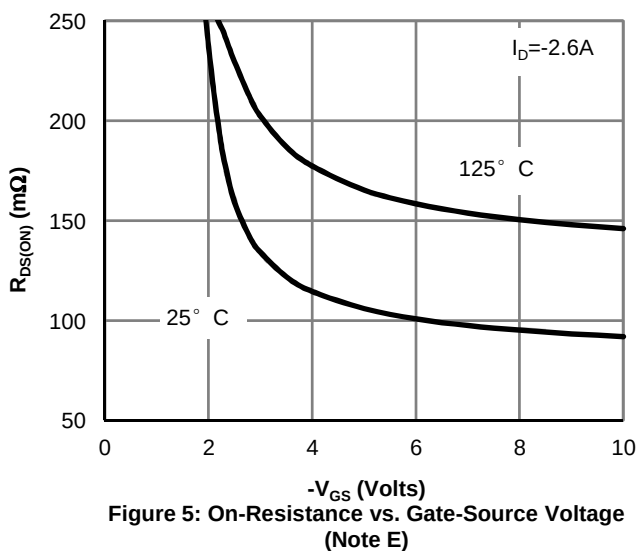


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

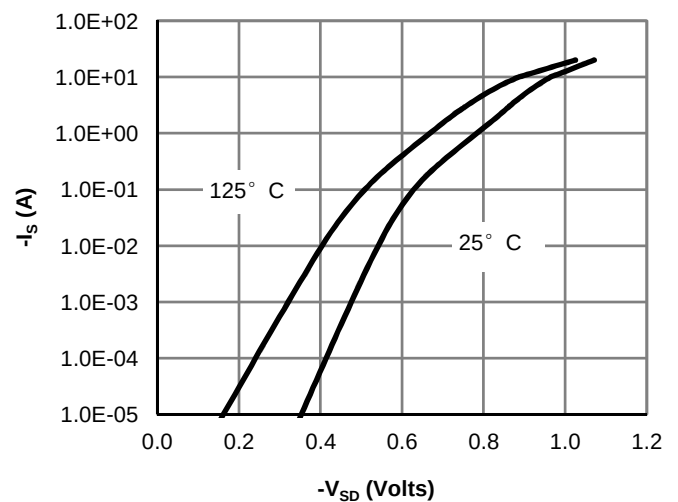


Figure 6: Body-Diode Characteristics (Note E)

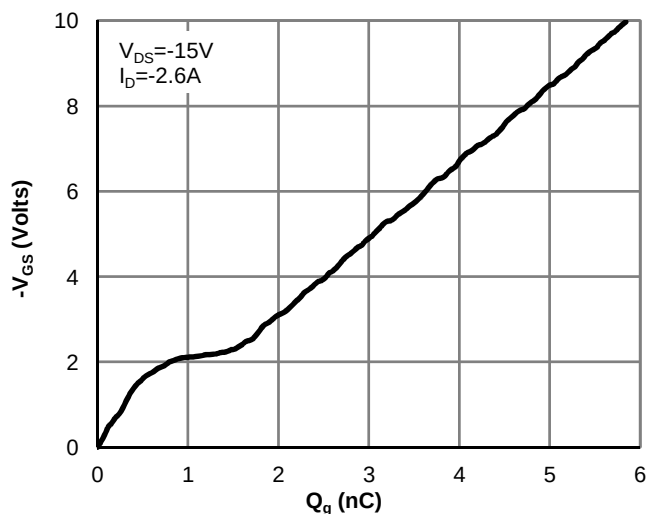


Figure 7: Gate-Charge Characteristics

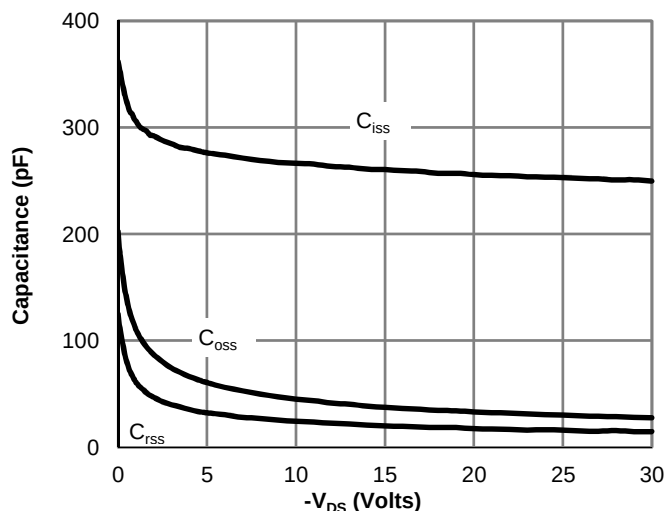


Figure 8: Capacitance Characteristics

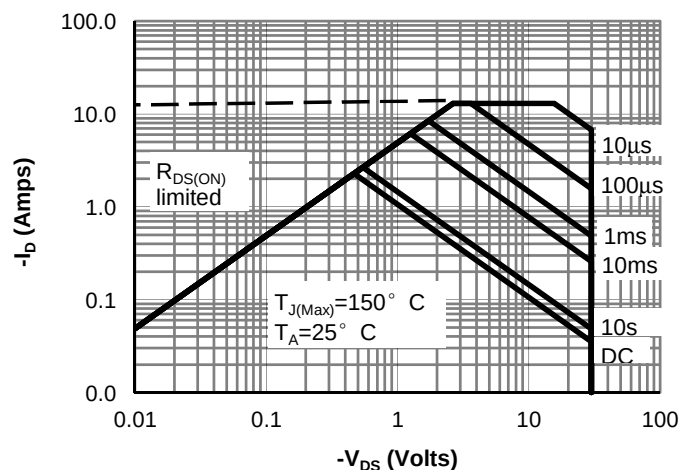


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

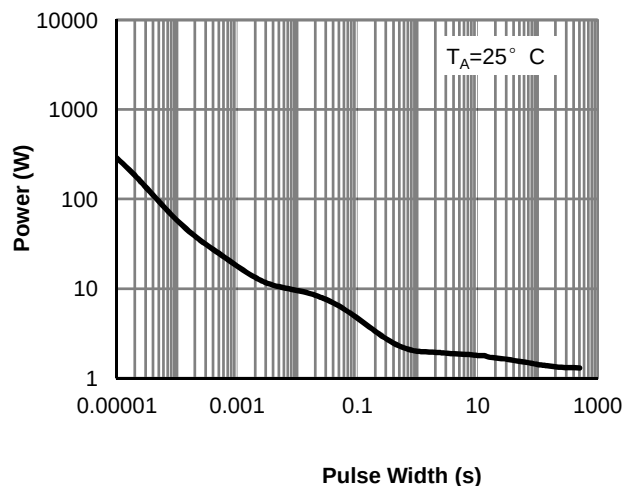


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

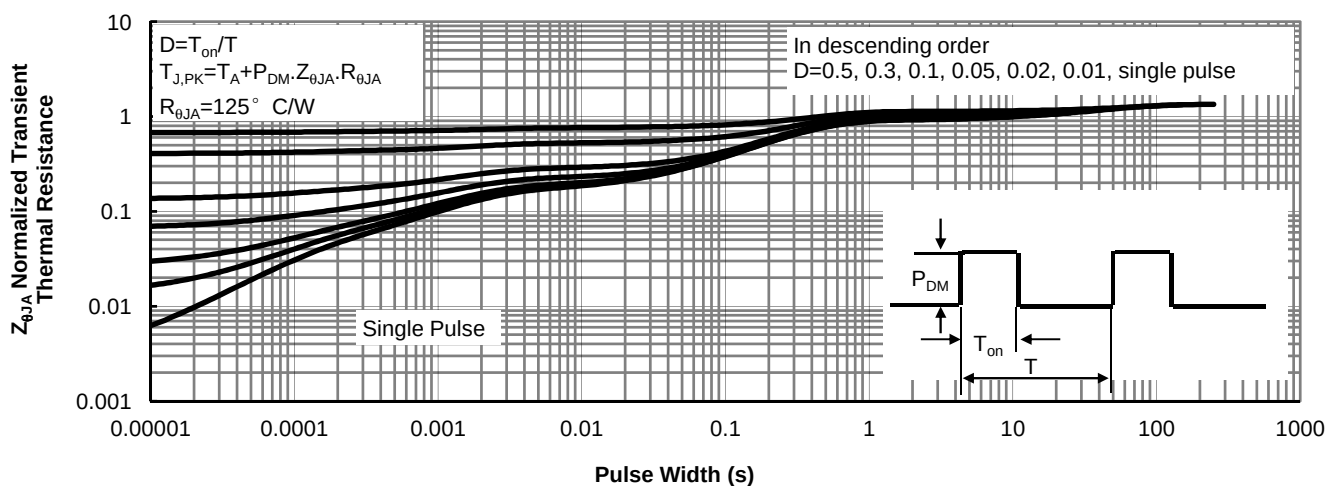
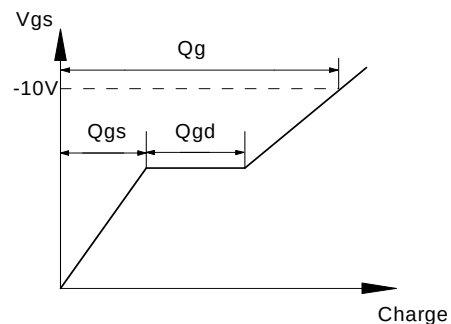
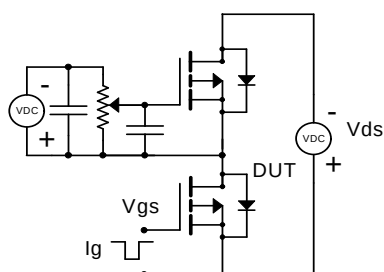


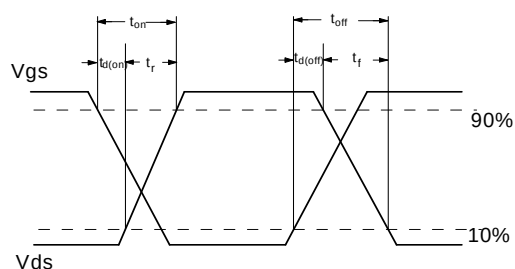
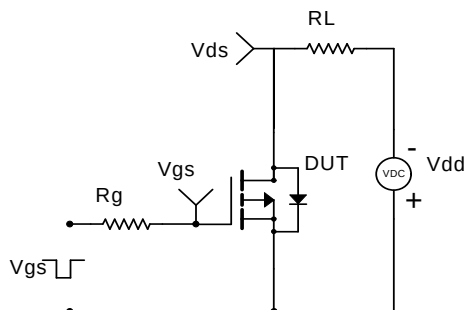
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

## • Test circuit

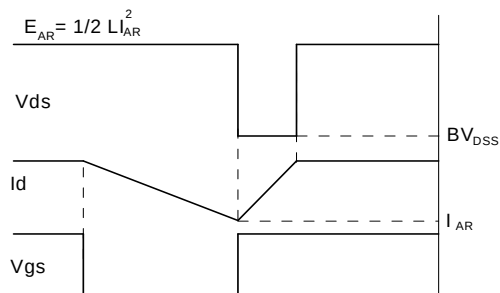
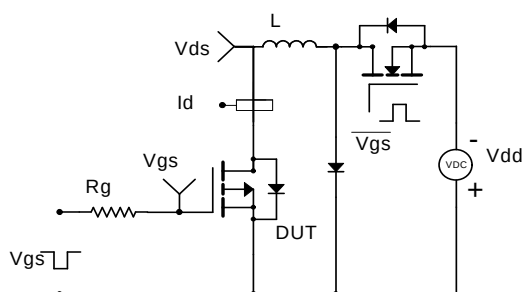
Gate Charge Test Circuit & Waveform



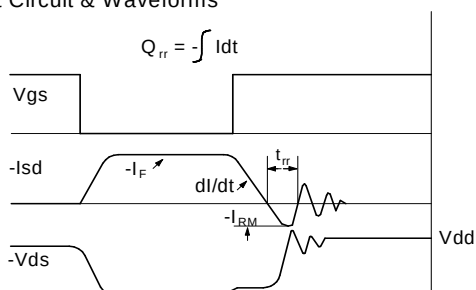
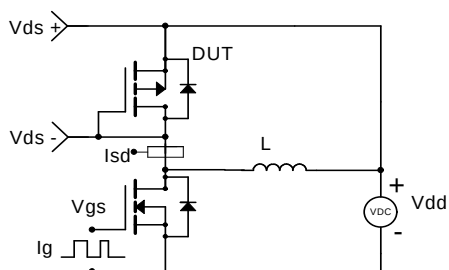
Resistive Switching Test Circuit & Waveforms



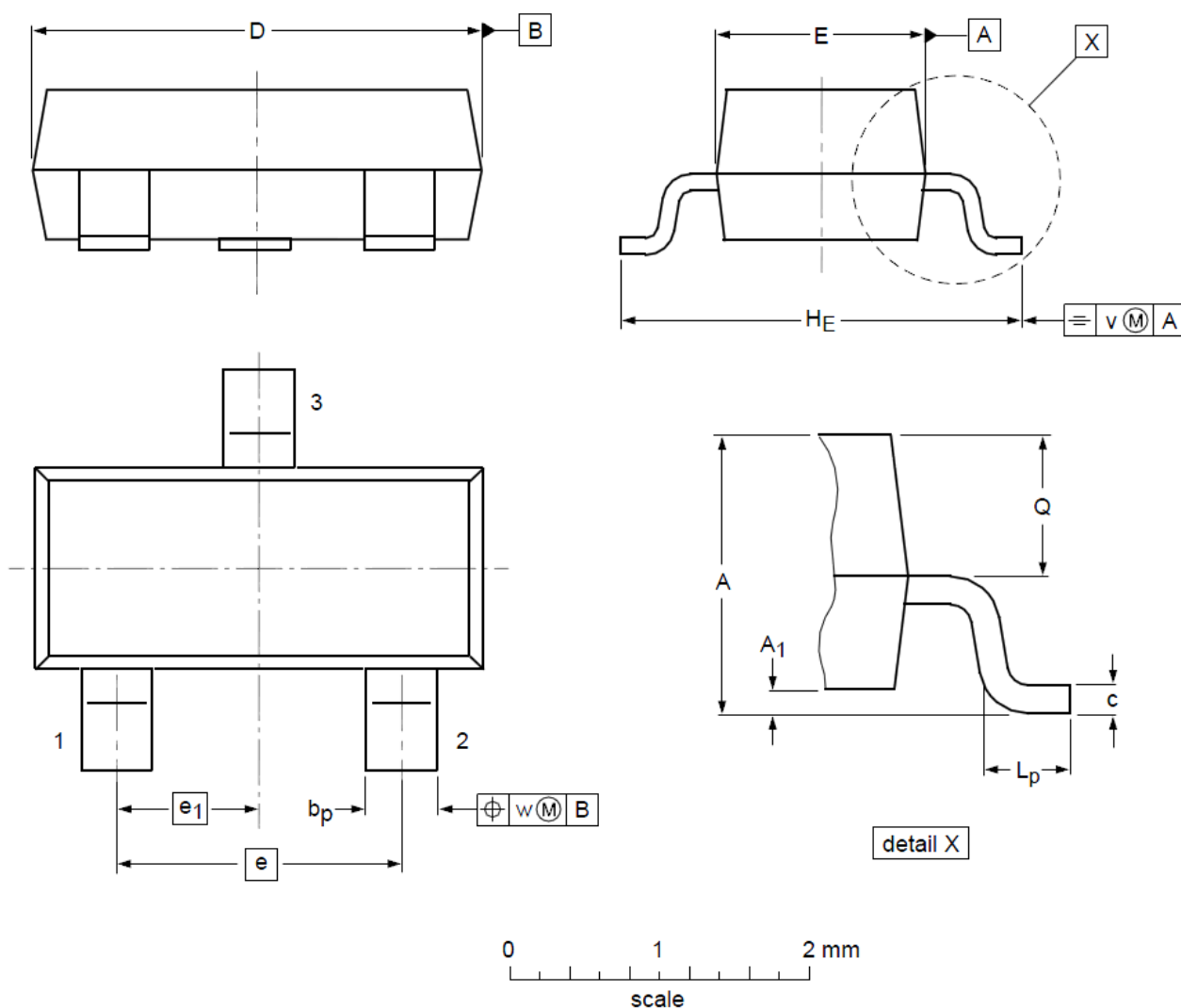
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



## SOT23-3L Package Outline Dimensions



**DIMENSIONS** ( unit : mm )

| Symbol               | Min  | Typ  | Max  | Symbol               | Min  | Typ  | Max  |
|----------------------|------|------|------|----------------------|------|------|------|
| <b>A</b>             | 1.00 | 1.17 | 1.30 | <b>A<sub>1</sub></b> | 0.01 | 0.05 | 0.10 |
| <b>b<sub>p</sub></b> | 0.35 | 0.39 | 0.50 | <b>c</b>             | 0.10 | 0.20 | 0.26 |
| <b>D</b>             | 2.70 | 2.90 | 3.10 | <b>E</b>             | 1.30 | 1.58 | 1.70 |
| <b>e</b>             | --   | 1.90 | --   | <b>e<sub>1</sub></b> | --   | 0.95 | --   |
| <b>H<sub>E</sub></b> | 2.50 | 2.78 | 3.00 | <b>L<sub>p</sub></b> | 0.20 | 0.32 | 0.60 |
| <b>Q</b>             | 0.23 | 0.27 | 0.33 | <b>v</b>             | --   | 0.20 | --   |
| <b>w</b>             | --   | 0.20 | --   |                      |      |      |      |