

## Features

- 150V/27A,  
 $R_{DS(ON)} = 35m\Omega(Typ.)@V_{GS}=10V$
- Excellent  $Q_G \times R_{DS(on)}$  product(FOM)
- SGT Technology
- 100% Avalanche Tested

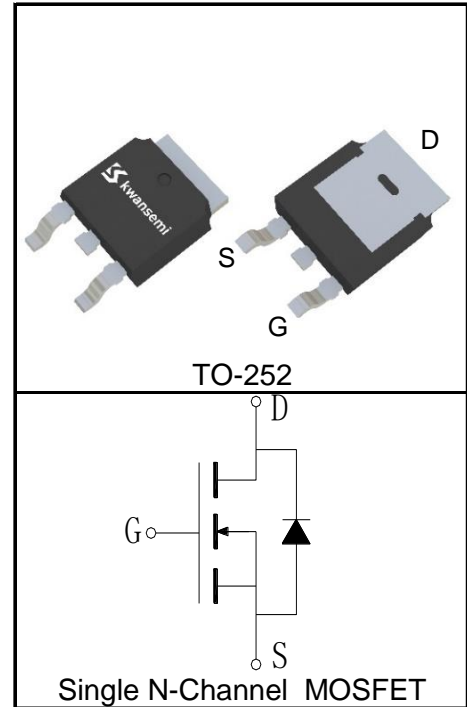
## Applications

- Power Switching Appliaction
- LED Backlighting



Halogen-Free

## Pin Description



## Absolute Maximum Ratings

| Symbol   | Parameter                                | Rating                        | Unit               |
|--|--|-------------------------------|--------------------|
| <b>Common Ratings</b> ( $T_C=25^\circ\text{C}$ Unless Otherwise Noted) |  |                               |                    |
| $V_{DSS}$  | Drain-Source Voltage                     | 150                           | V                  |
| $V_{GSS}$  | Gate-Source Voltage                      | $\pm 20$                      |                    |
| $T_{Jmax}$   | Maximum Junction Temperature             | 175                           | $^\circ\text{C}$   |
| $T_J, T_{STG}$   | Operating and Storage Temperature Range  | -55 to 175                    | $^\circ\text{C}$   |
| $I_S$  | Diode Continuous Forward Current         | $T_C=25^\circ\text{C}$<br>27  | A                  |
| <b>Mounted on Large Heat Sink</b>                                      |  |                               |                    |
| $I_{DP}^{①}$   | Pulse Drain Current                      | $T_C=25^\circ\text{C}$<br>108 | A                  |
| $I_D^{②}$  | Continuous Drain Current( $V_{GS}=10V$ ) | $T_C=25^\circ\text{C}$<br>27  | A                  |
|  |  | $T_C=100^\circ\text{C}$<br>19 |                    |
| $P_D$  | Maximum Power Dissipation                | $T_C=25^\circ\text{C}$<br>65  | W                  |
|  |  | $T_C=100^\circ\text{C}$<br>32 |                    |
| $R_{\theta JC}$  | Thermal Resistance-Junction to Case      | 2.3                           | $^\circ\text{C/W}$ |
| $R_{\theta JA}^{③}$  | Thermal Resistance-Junction to Ambient   | 100                           | $^\circ\text{C/W}$ |
| <b>Drain-Source Avalanche Ratings</b>                                  |  |                               |                    |
| $E_{AS}^{④}$   | Avalanche Energy, Single Pulsed          | 110                           | mJ                 |

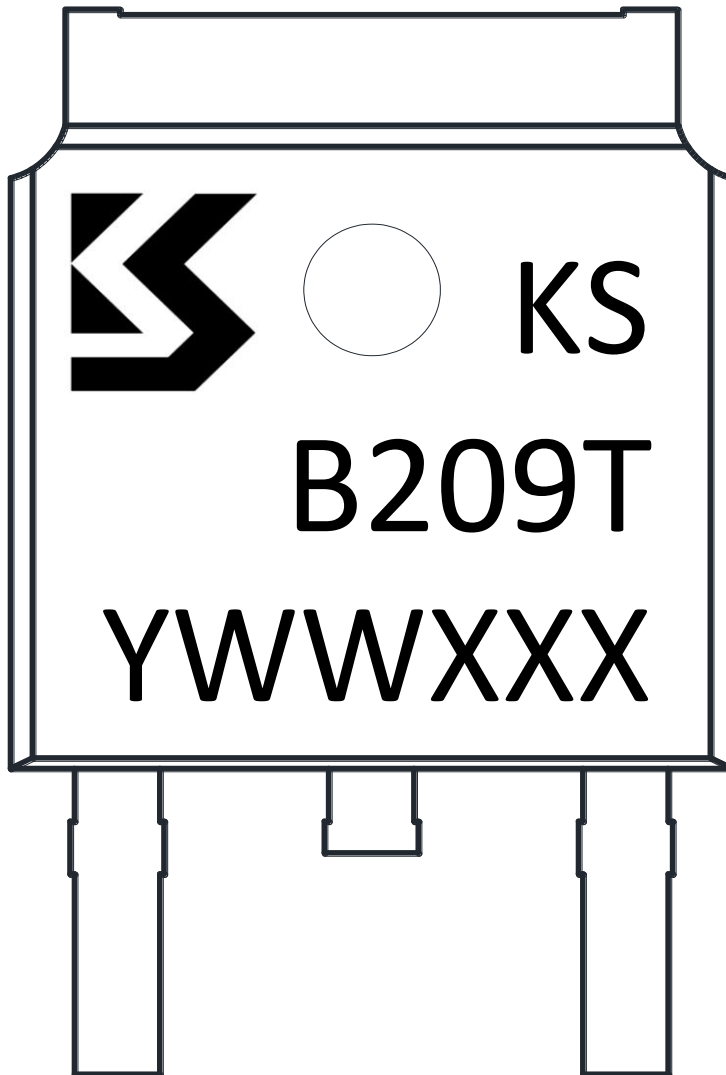
**Electrical Characteristics** ( $T_C=25^\circ\text{C}$  Unless Otherwise Noted)

| Symbol   | Parameter                        | Test Condition  | KSB209DAT |      |           | Unit      |
|--|----------------------------------|---|-----------|------|-----------|-----------|
|  |                                  |   | Min.      | Typ. | Max.      |           |
| <b>Static Characteristics</b>                    |                                  |   |           |      |           |           |
| $BV_{DSS}$                                       | Drain-Source Breakdown Voltage   | $V_{GS}=0V, I_{DS}=250\mu A$                            | 150       |      |           | V         |
| $I_{DSS}$  | Zero Gate Voltage Drain Current  | $V_{DS}=150V, V_{GS}=0V$                                |           |      | 1         | $\mu A$   |
|  |                                  | $T_J=125^\circ C$                                       |           |      | 30        |           |
| $V_{GS(th)}$                                     | Gate Threshold Voltage           | $V_{DS}=V_{GS}, I_{DS}=250\mu A$                        | 2         | 3    | 4         | V         |
| $I_{GSS}$  | Gate Leakage Current             | $V_{GS}=\pm 20V, V_{DS}=0V$                             |           |      | $\pm 100$ | nA        |
| $R_{DS(ON)}^{(5)}$                               | Drain-Source On-state Resistance | $V_{GS}=10V, I_{DS}=13A$                                |           | 35   | 42        | $m\Omega$ |
|  |                                  | $V_{GS}=6V, I_{DS}=6A$                                  |           | 38   | 50        | $m\Omega$ |
| <b>Diode Characteristics</b>                     |                                  |   |           |      |           |           |
| $V_{SD}^{(5)}$                                   | Diode Forward Voltage            | $I_{SD}=13A, V_{GS}=0V$                                 |           | 0.87 | 1.2       | V         |
| $t_{rr}$   | Reverse Recovery Time            | $I_{SD}=13A, di_{SD}/dt=100A/\mu s$                     |           | 36   |           | ns        |
| $Q_{rr}$   | Reverse Recovery Charge          |   |           | 61   |           | nC        |
| <b>Dynamic Characteristics<sup>(6)</sup></b>     |                                  |   |           |      |           |           |
| $R_G$  | Gate Resistance                  | $V_{GS}=0V, V_{DS}=0V, F=1MHz$                          |           | 1.5  |           | $\Omega$  |
| $C_{iss}$  | Input Capacitance                | $V_{GS}=0V,$<br>$V_{DS}=75V,$<br>Frequency=1.0MHz       |           | 1265 |           | pF        |
| $C_{oss}$  | Output Capacitance               |   |           | 95   |           |           |
| $C_{rss}$  | Reverse Transfer Capacitance     |   |           | 10   |           |           |
| $t_{d(ON)}$                                      | Turn-on Delay Time               | $V_{DD}=75V, I_{DS}=13A,$<br>$V_{GEN}=10V, R_G=3\Omega$ |           | 12   |           | ns        |
| $t_r$  | Turn-on Rise Time                |   |           | 17   |           |           |
| $t_{d(OFF)}$                                     | Turn-off Delay Time              |   |           | 33   |           |           |
| $t_f$  | Turn-off Fall Time               |   |           | 24   |           |           |
| <b>Gate Charge Characteristics<sup>(6)</sup></b> |                                  |   |           |      |           |           |
| $Q_g$  | Total Gate Charge                | $V_{DS}=75V, V_{GS}=10V,$<br>$I_{DS}=13A$               |           | 21   |           | nC        |
| $Q_{gs}$   | Gate-Source Charge               |   |           | 5.6  |           |           |
| $Q_{gd}$   | Gate-Drain Charge                |   |           | 6.3  |           |           |

- Notes:
- ① Pulse width limited by safe operating area.
  - ② Calculated continuous current based on maximum allowable junction temperature.
  - ③ When mounted on 1 inch square copper board,  $t \leq 10\text{sec}$ . The value in any given application depends on the user's specific board design.
  - ④ Limited by  $T_{Jmax}$ , Starting  $T_J = 25^\circ C$ ,  $I_{ASmax} = 21A$ ,  $L=0.5mH$ ,  $V_{DD} = 48V$ ,  $R_G = 25\Omega$ ,  $V_{GS}=10V$ . Part not recommended for use above this value. 100% Final Test at  $I_{AS}=15A$ ,  $L=0.5mH$ .
  - ⑤ Pulse test; Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
  - ⑥ Guaranteed by design, not subject to production testing.

**Ordering and Marking Information**

| Device    | Package | Packaging | Quantity | Reel Size | Tape width |
|-----------|---------|-----------|----------|-----------|------------|
| KSB209DAT | TO-252  | Tape&Reel | 2500     | 13"       | 16mm       |

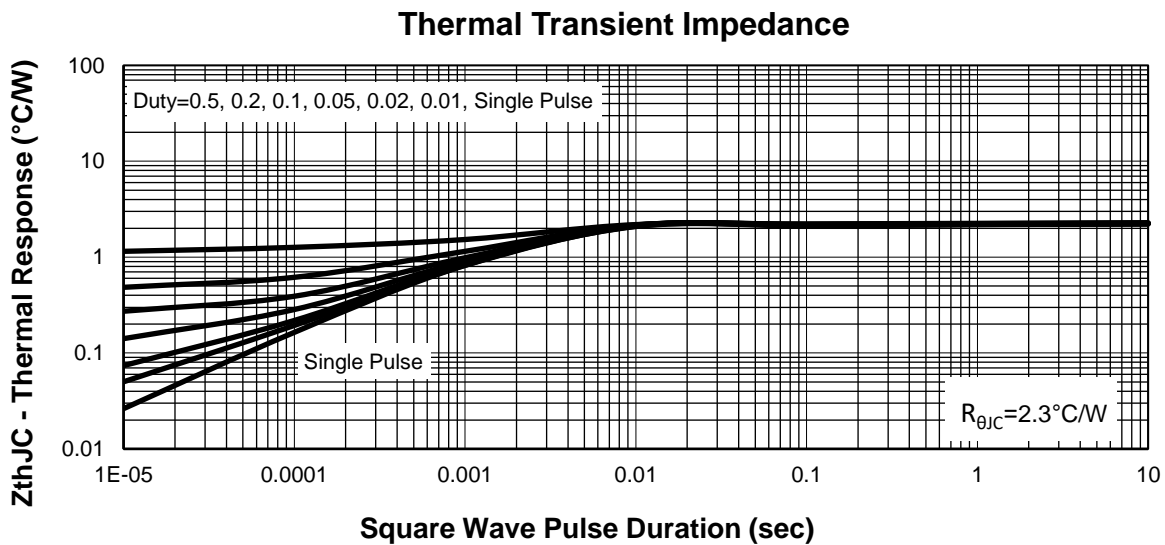
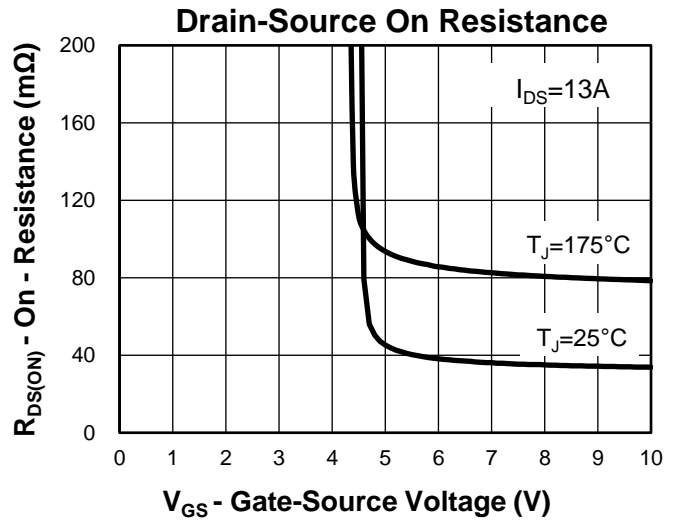
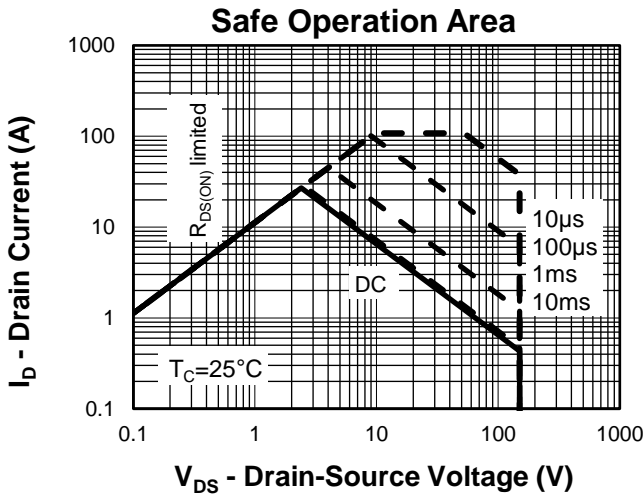
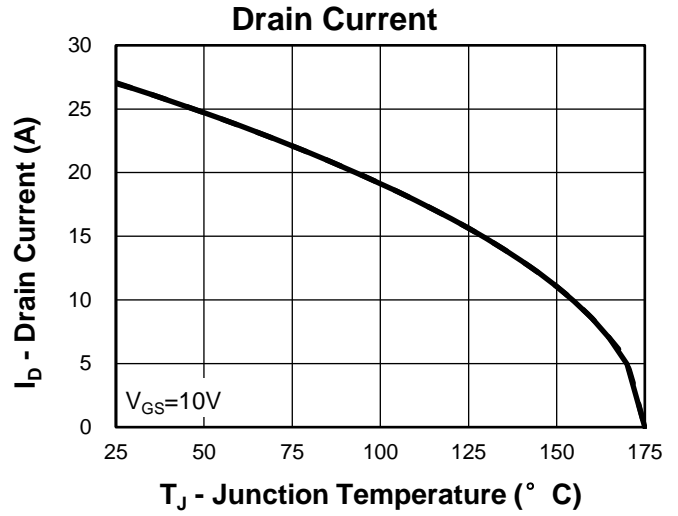
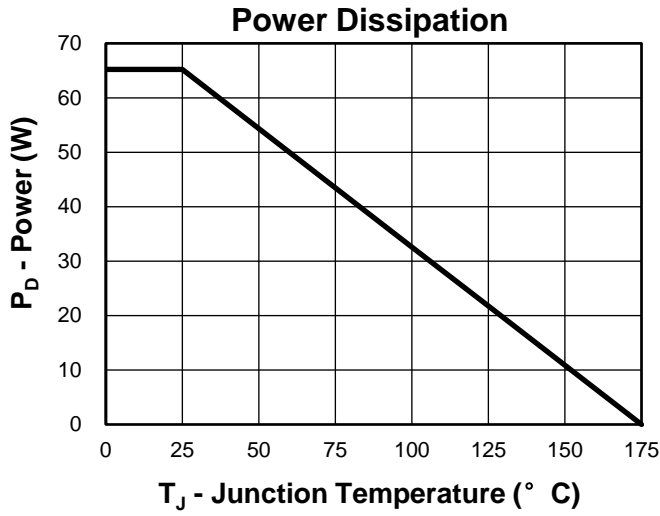


1st Line: Kwansemi LOGO, Kwansemi Code(KS)

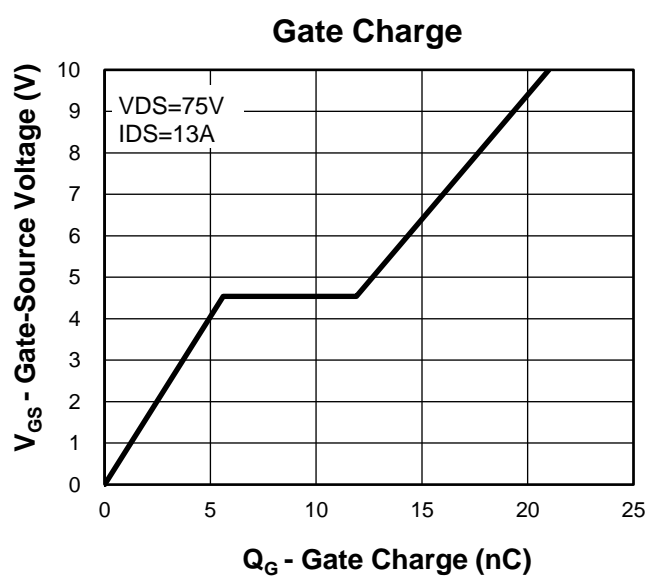
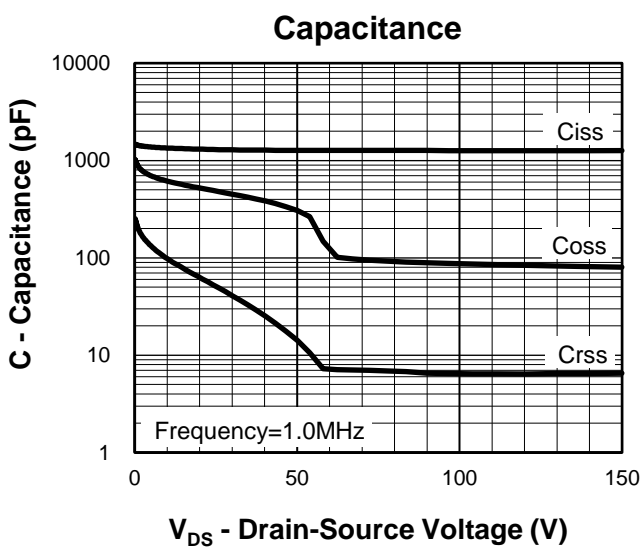
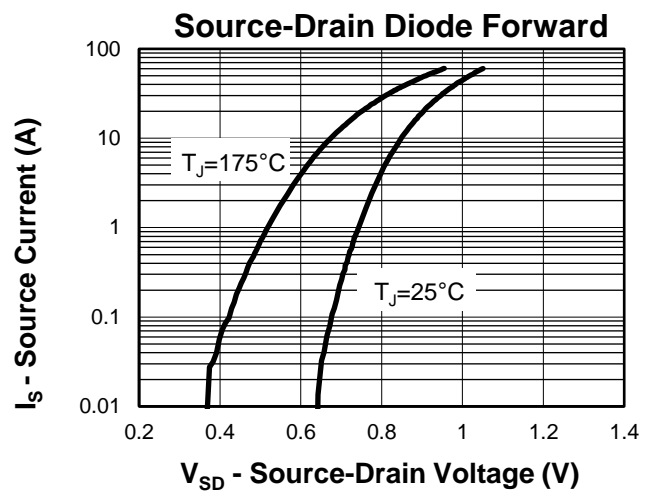
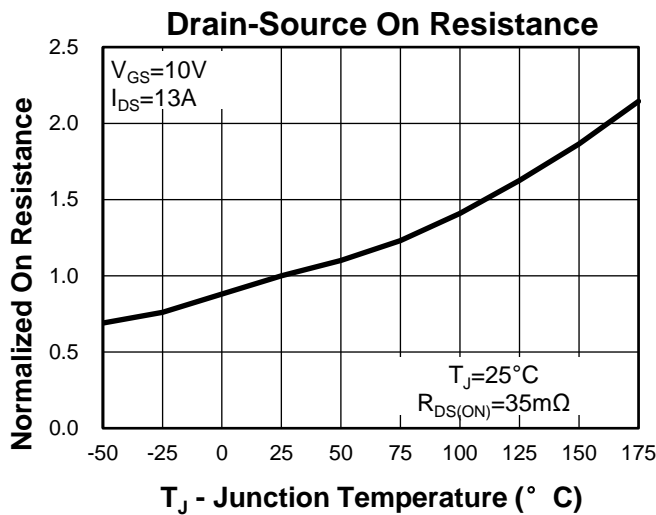
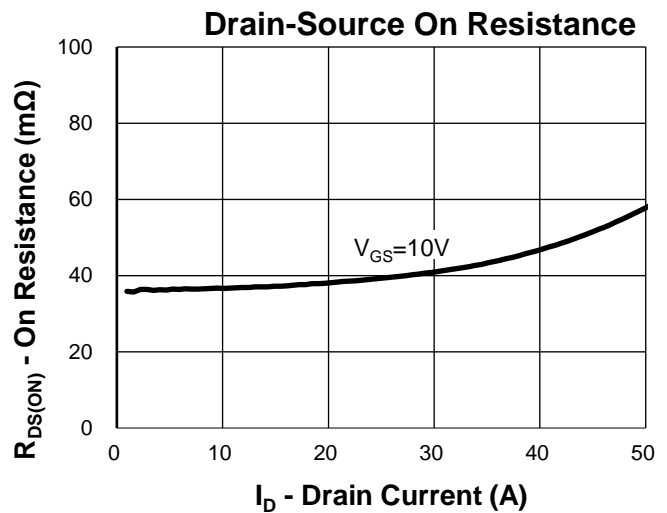
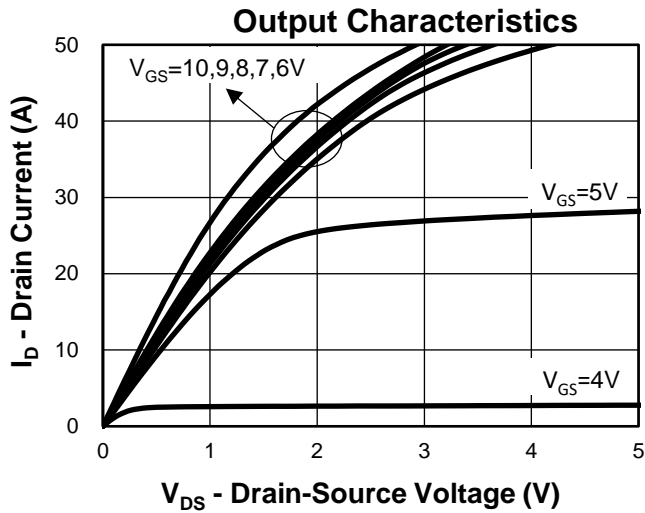
2nd Line: Part Number(B209T)

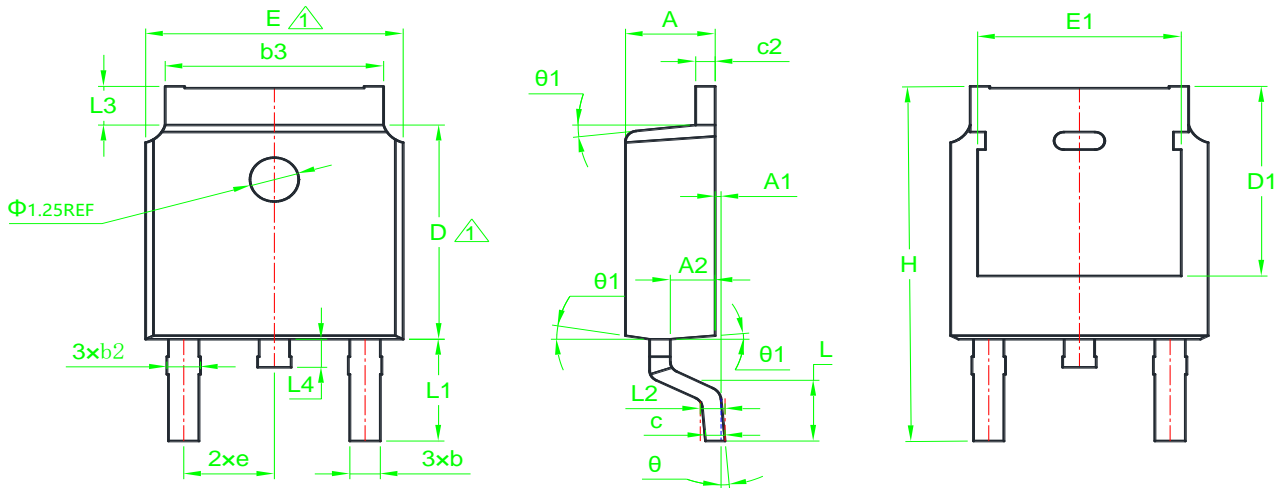
3rd Line: Lot Number(YWWXXX)

### Typical Characteristics




### Typical Characteristics

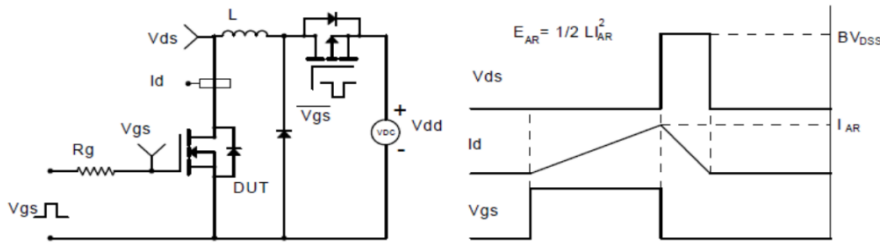


**Package Information**
**TO-252**


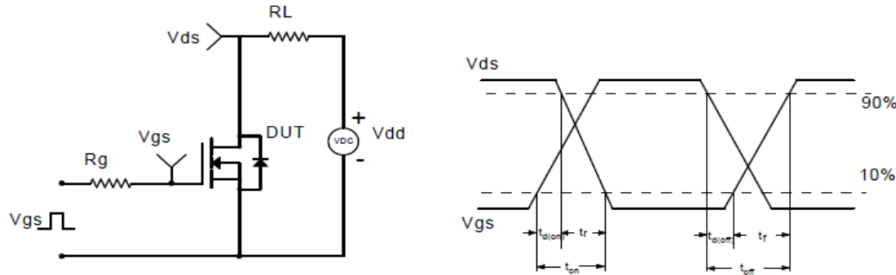
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|--------|----------|------|------|----------|-------|-------|--------|----------|-------|-------|----------|-------|-------|
|        | MIN      | NOM  | MAX  | MIN      | NOM   | MAX   |        | MIN      | NOM   | MAX   | MIN      | NOM   | MAX   |
| A      | 2.20     | 2.30 | 2.38 | 0.087    | 0.091 | 0.094 | E      | 6.40     | 6.60  | 6.70  | 0.252    | 0.260 | 0.264 |
| A1     | 0.00     | *    | 0.15 | 0.000    | *     | 0.006 | E1     | 4.55     | *     | 5.15  | 0.179    | *     | 0.203 |
| A2     | 0.90     | 1.00 | 1.10 | 0.035    | 0.039 | 0.043 | H      | 9.60     | 10.10 | 10.40 | 0.378    | 0.398 | 0.409 |
| b      | 0.65     | 0.75 | 0.85 | 0.026    | 0.030 | 0.033 | L      | 1.40     | 1.50  | 1.70  | 0.055    | 0.059 | 0.067 |
| b2     | 0.72     | *    | 0.90 | 0.028    | *     | 0.035 | L1     | 2.90REF  |       |       | 0.114REF |       |       |
| b3     | 5.13     | 5.33 | 5.46 | 0.202    | 0.210 | 0.215 | L2     | 0.508BSC |       |       | 0.020BSC |       |       |
| c      | 0.47     | 0.51 | 0.54 | 0.019    | 0.020 | 0.021 | L3     | 0.90     | *     | 1.25  | 0.035    | *     | 0.049 |
| D      | 6.00     | 6.10 | 6.20 | 0.236    | 0.240 | 0.244 | L4     | 0.60     | *     | 1.00  | 0.024    | *     | 0.039 |
| D1     | 5.25     | 5.35 | 5.60 | 0.207    | 0.211 | 0.220 | θ      | 0°       | *     | 10°   | 0°       | *     | 10°   |
| e      | 2.286BSC |      |      | 0.090BSC |       |       | θ1     | 5°       | *     | 9°    | 5°       | *     | 9°    |

 Dimensions D and E do not include mold flash protrusions or gate burrs.

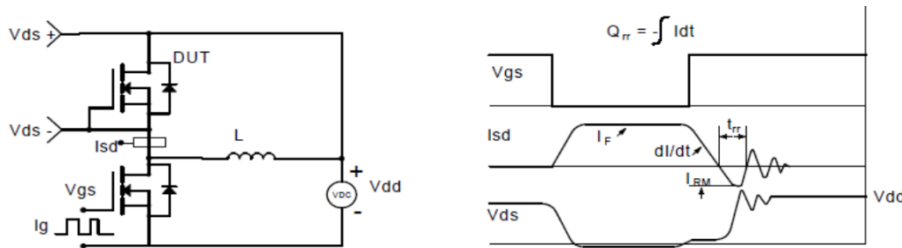
### Avalanche Test Circuit and Waveforms



### Switching Time Test Circuit and Waveforms



### Diode Recovery Test Circuit and Waveforms



### Gate Charge Test Circuit and Waveform



### Customer Service

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