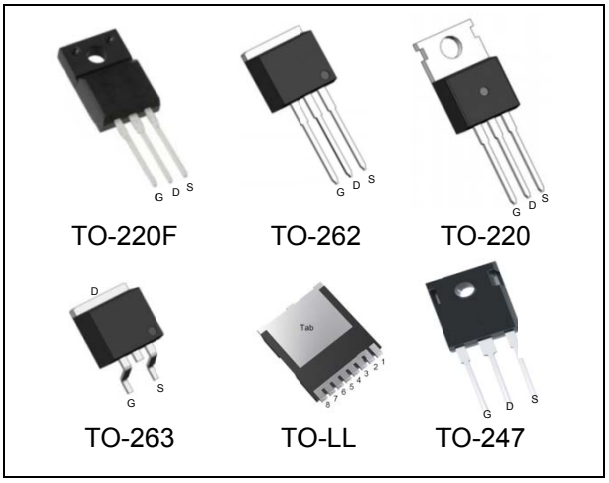
# N-channel 150V 3.6mΩ Power MOSFET

## Description

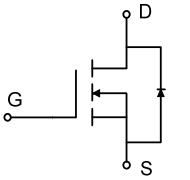
WMOS™ JN is suitable for applications which require superior power density and outstanding efficiency.

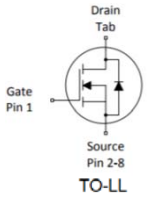



## Features

- Gate charge minimized
- Typ. $R_{DS(on)}$ =3.6mΩ
- 100% UIS tested
- Pb-free plating, Halogen free

RoHS compliant




## Applications

Switching applications

### Absolute Maximum Ratings

| Parameter | Symbol | WMK/WMM/WMN/WMJ/WMLL | WML | Unit |
|---|---|---|---|---|
| Drain-source voltage | $V_{DSS}$ | 150 | | V |
| Continuous drain current[1] ( $T_C$ = 25°C ) | $I_D$ | 220 | | A |
| ( $T_C$ = 100°C ) | | 132 | | A |
| Pulsed drain current[2] | $I_{DM}$ | 650 | | A |
| Gate-source voltage | $V_{GS}$ | ±20 | | V |
| Avalanche energy, single pulse[3] | $E_{AS}$ | 800 | | mJ |
| Avalanche energy, repetitive[2] | $E_{AR}$ | 0.3 | | mJ |
| Avalanche current, repetitive[2] | $I_{AR}$ | 5 | | A |
| Power dissipation ( $T_C$ = 25°C ) | $P_D$ | 416 | 35 | W |
| - Derate above 25°C | | 3.33 | 0.28 | W/°C |
| Operating and storage temperature range | $T_j$, $T_{stg}$ | -55 to +150 | | °C |
| Continuous diode forward current | $I_S$ | 220 | | A |
| Diode pulse current | $I_{S,pulse}$ | 650 | | A |

### Thermal Characteristics

| Parameter | Symbol | WMK/WMM/WMN/WMJ/WMLL | WML | Unit |
|---|---|---|---|---|
| Thermal resistance, junction-to-case | $R_{\theta JC}$ | 0.3 | 3.5 | °C/W |
| Thermal resistance, junction-to-ambient | $R_{\theta JA}$ | 62 | 80 | °C/W |

## Electrical Characteristics $T_c$ = 25°C, unless otherwise noted

| Parameter | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static characteristics** | | | | | | |
| Drain-source breakdown voltage | $BV_{DSS}$ | $V_{GS}$=0 V, $I_D$=1 mA | 150 | - | - | V |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=0.25mA | 2.2 | 3.2 | 4.2 | V |
| Drain cut-off current | $I_{DSS}$ | $V_{DS}$=150 V, $V_{GS}$=0V, | | | | μA |
| | | $T_j$ = 25°C | - | - | 1 | |
| | | $T_j$ = 125°C | - | 30 | - | |
| Gate leakage current, forward | $I_{GSSF}$ | $V_{GS}$=20V, $V_{DS}$=0V | - | - | 500 | nA |
| Drain-source on-state resistance | $R_{DS(on)}$ | $V_{GS}$=10 V, $I_D$=30A | - | | | |
| | | $T_j$ = 25°C | - | 3.6 | 4.4 | mΩ |
| **Dynamic characteristics** | | | | | | |
| Input capacitance | $C_{iss}$ | $V_{DS}$= 100V, $V_{GS}$= 0V, | - | 9660 | - | |
| Output capacitance | $C_{oss}$ | f = 1 MHz | - | 380 | - | pF |
| Reverse transfer capacitance | $C_{rss}$ | | - | 83 | - | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$ = 100V, $I_D$ = 40A | - | 40 | - | |
| Rise time | $t_r$ | $R_G$ = 4.7Ω, $V_{GS}$=10V | - | 63 | - | ns |
| Turn-off delay time | $t_{d(off)}$ | | - | 185 | - | |
| Fall time | $t_f$ | | - | 13 | - | |
| **Gate charge characteristics** | | | | | | |
| Gate to source charge | $Q_{gs}$ | $V_{DD}$=120V, $I_D$=40A, | - | 54 | - | |
| Gate to drain charge | $Q_{gd}$ | $V_{GS}$=0 to 10V | - | 43 | - | nC |
| Gate charge total | $Q_g$ | | - | 186 | - | |
| Gate plateau voltage | $V_{plateau}$ | | - | 5.0 | - | V |
| **Reverse diode characteristics** | | | | | | |
| Diode forward voltage | $V_{SD}$ | $V_{GS}$=0 V, $I_F$=40A | - | - | 1.2 | V |
| Reverse recovery time | $t_{rr}$ | $V_R$=50V, $I_F$=40A, | - | 152 | - | ns |
| Reverse recovery charge | $Q_{rr}$ | $dI_F/dt$=100A/μs | - | 0.6 | - | μC |
| Peak reverse recovery current | $I_{rrm}$ | | - | 8.2 | - | A |

Notes:

1. Limited by $T_{j\,max}$. Maximum duty cycle D=0.5.

2. Repetitive rating: pulse width limited by maximum junction temperature.

3. $I_{AS}$ = 5A, $V_{DD}$ = 50V, $R_G$ = 25Ω, starting $T_j$ = 25°C.

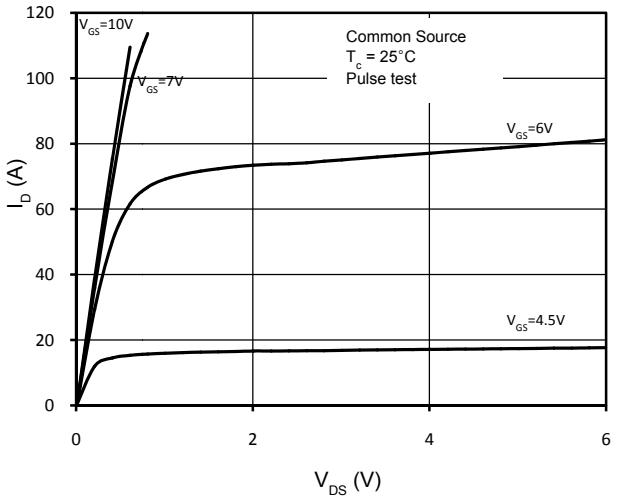



Figure 1.On-Region Characteristics

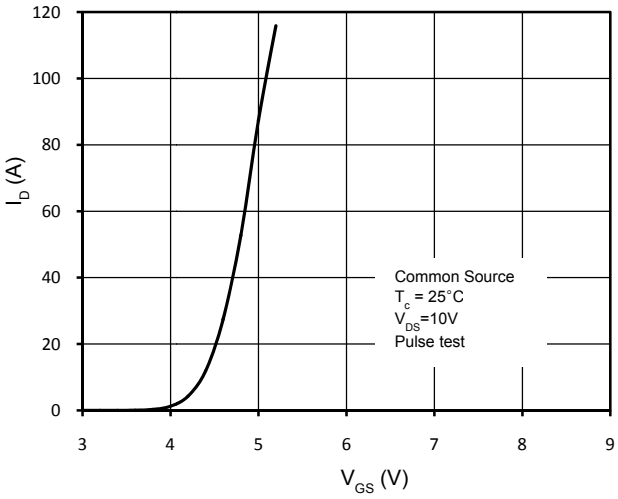



Figure 2. Transfer Characteristics

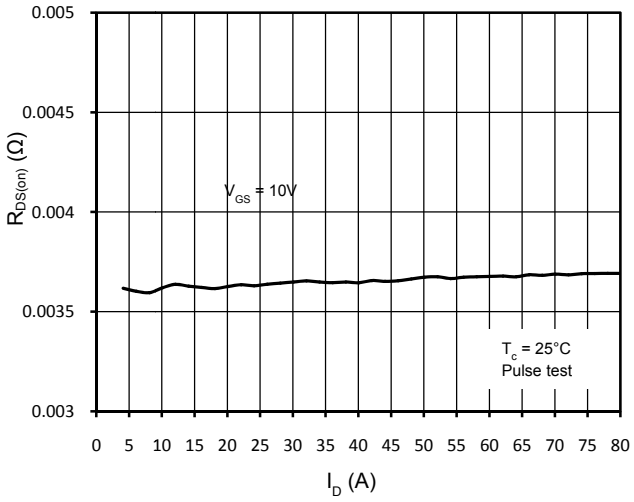



Figure 3. Static Drain-Source On Resistance

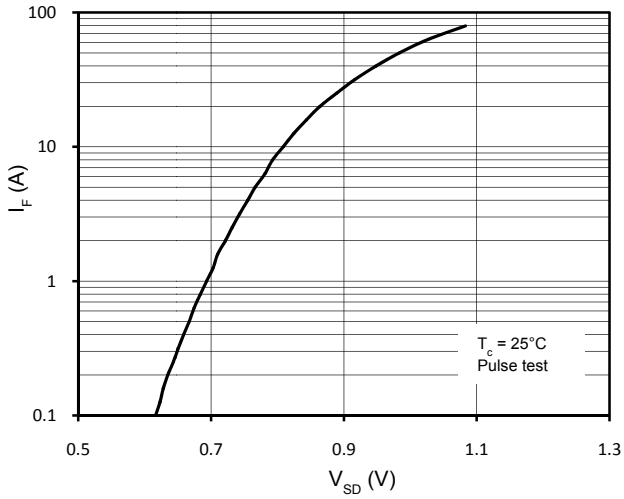



Figure 4. Body- Diode Forward Characteristics

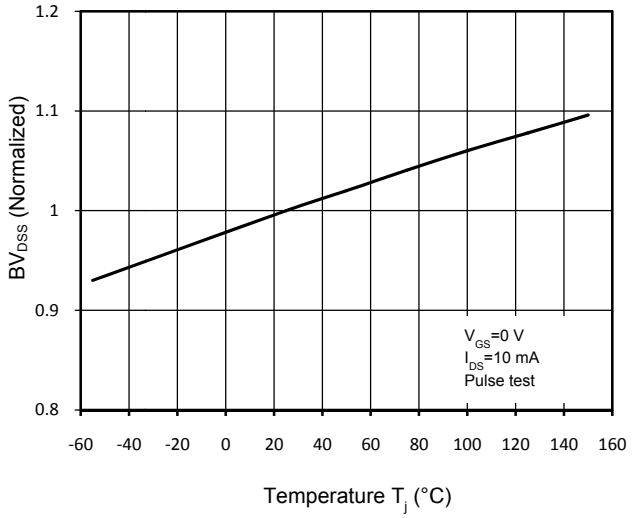



Figure 5. Normalized $BV_{DSS}$ vs. Temperature

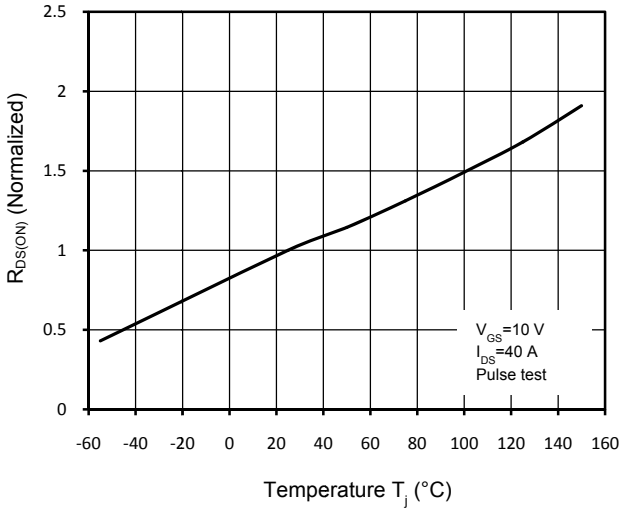



Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

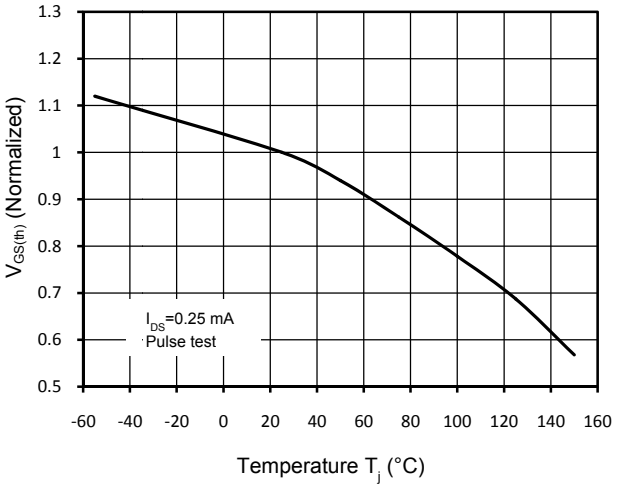



Figure 7. Threshold Voltage vs. Temperature

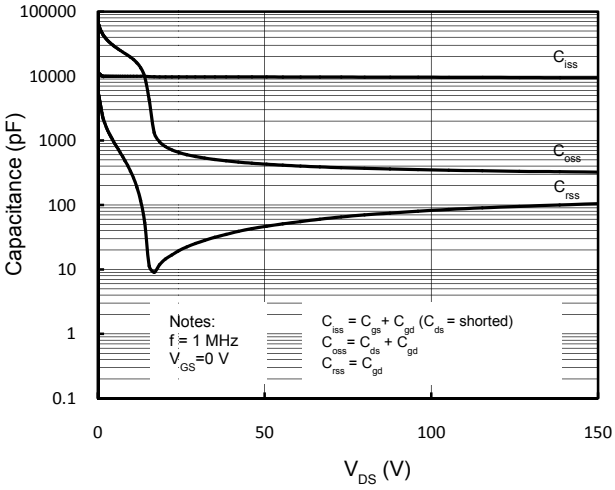



Figure 8. Capacitance Characteristics

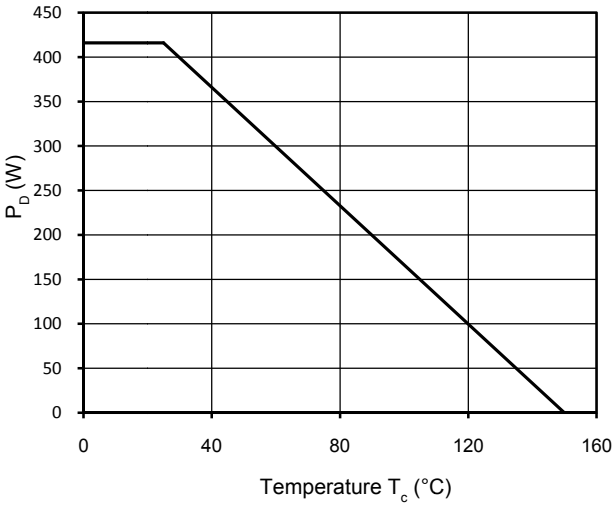



Figure 9. Power Dissipation

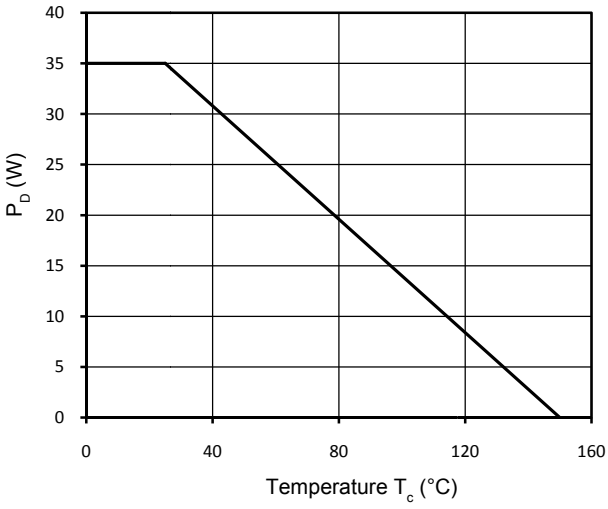



Figure 10. Power Dissipation (TO-220F)

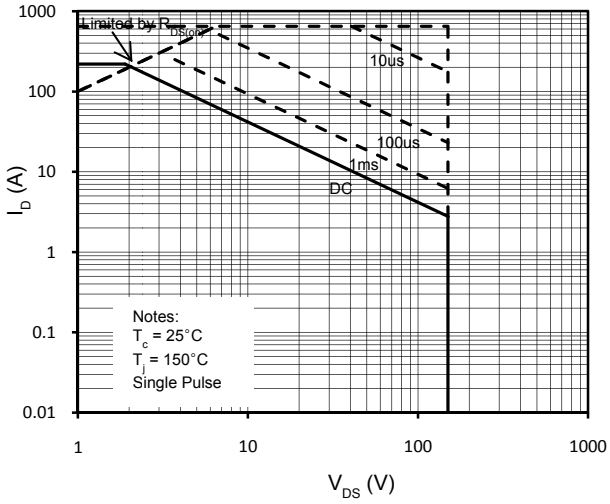



Figure 11. Maximum Safe Operating Area

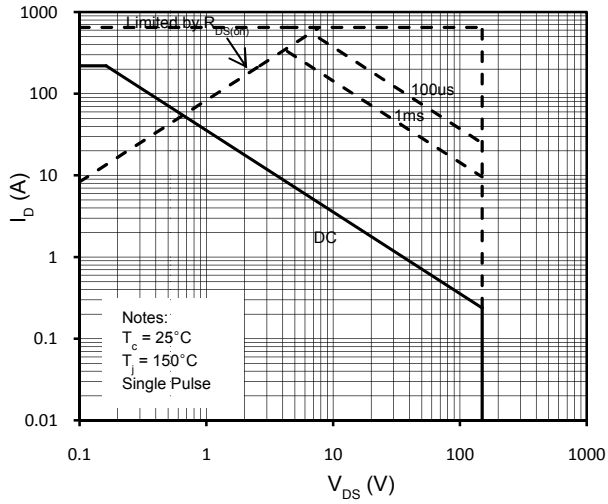



Figure 12. Maximum Safe Operating Area(TO-220F)

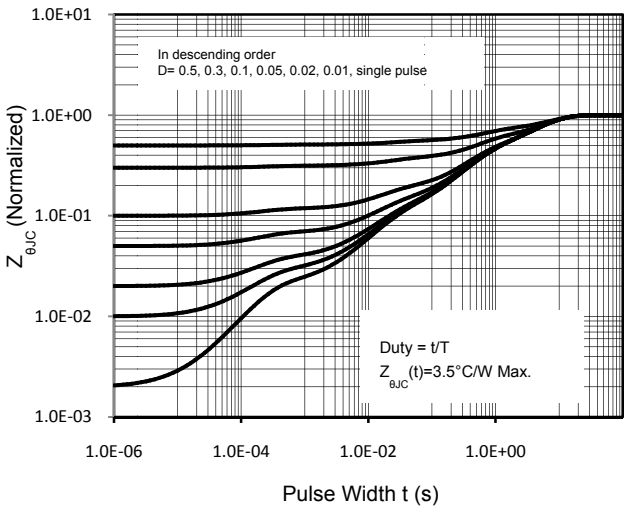



Figure 13. Transient Thermal Response Curve (TO-220F)

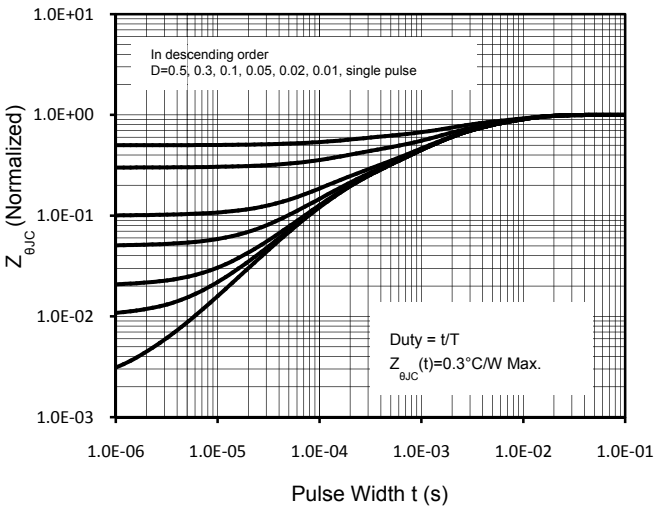



Figure 14. Transient Thermal Response Curve

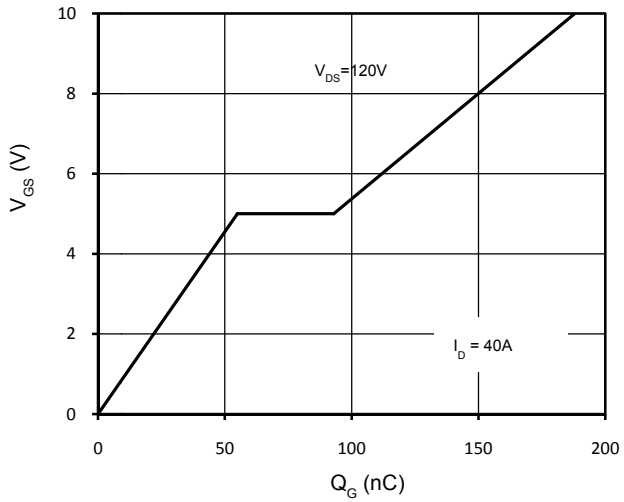
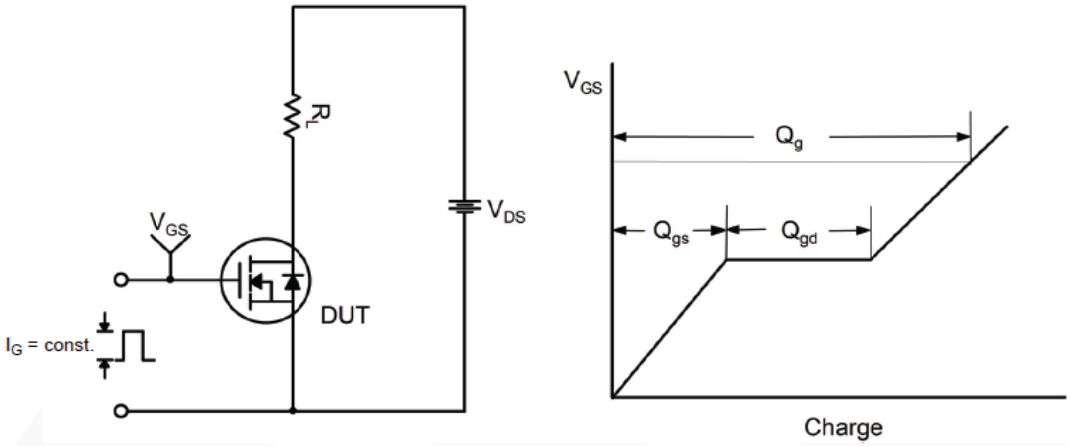
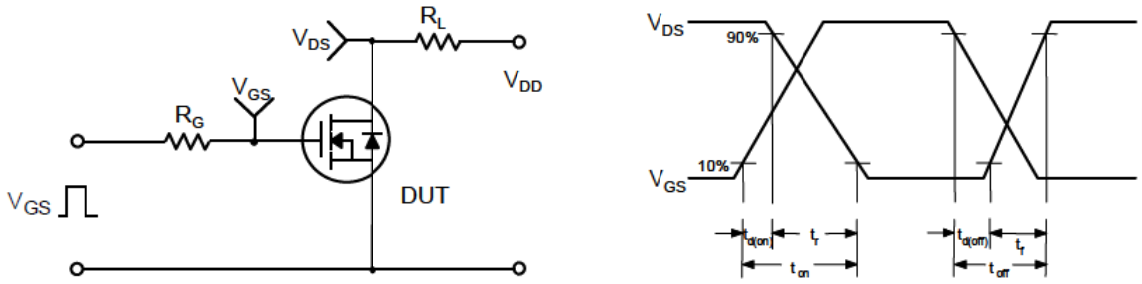



Figure 15. Gate Charge Characteristics

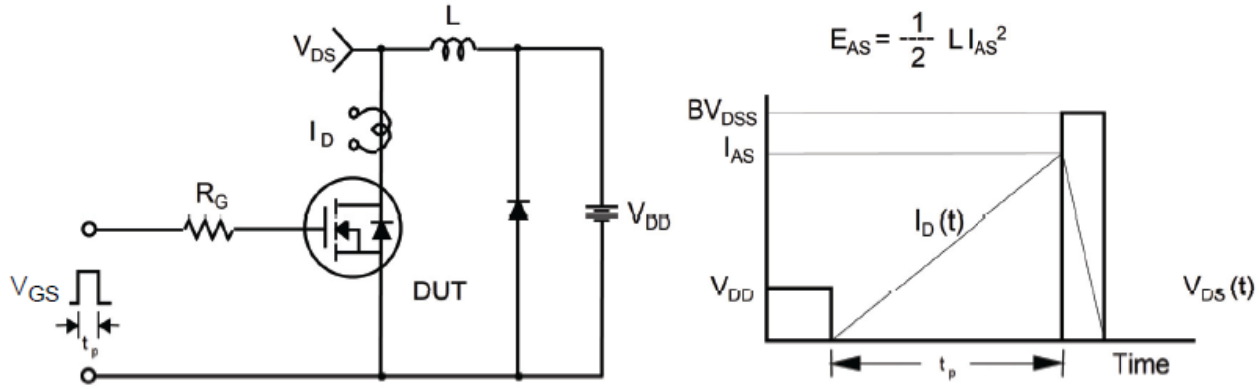
## Gate Charge Test Circuit & Waveform



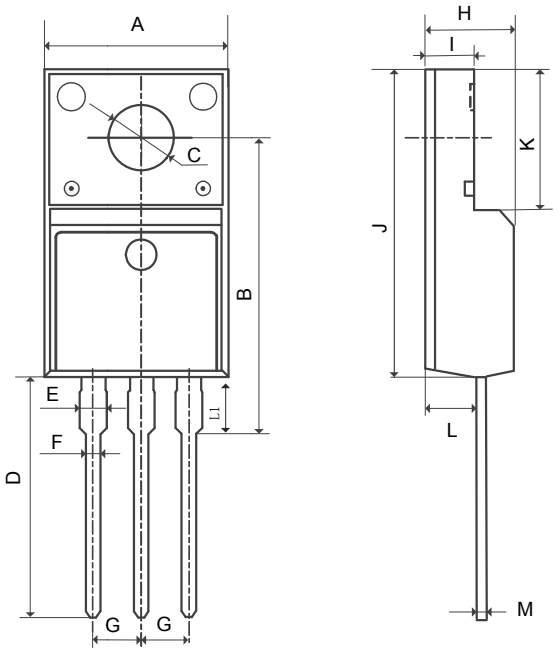

## Switching Test Circuit & Waveforms




## Unclamped Inductive Switching Test Circuit & Waveforms



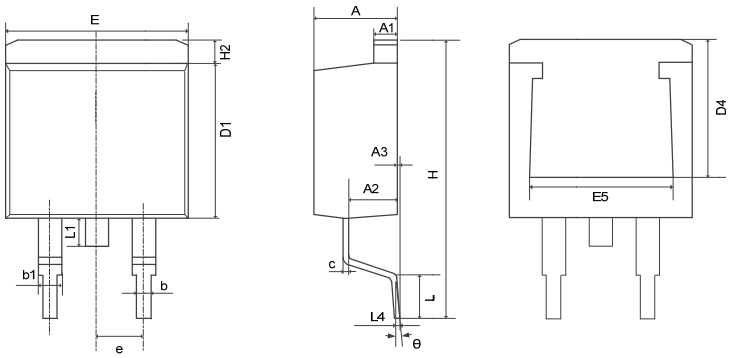
## Mechanical Dimensions for TO-220F




COMMON DIMENSIONS

| SYMBOL | MM | |
|---|---|---|
| | MIN | MAX |
| A | 9.96 | 10.36 |
| B | 15.10 | 16.10 |
| C | 3.03 | 3.38 |
| D | 12.64 | 13.28 |
| E | 1.18 | 1.58 |
| F | 0.70 | 0.95 |
| G | 2.54REF | |
| H | 4.50 | 4.90 |
| I | 2.34 | 2.74 |
| J | 15.57 | 16.17 |
| K | 6.70REF | |
| L | 2.56 | 2.96 |
| M | 0.40 | 0.65 |
| L1 | 2.85 | 3.45 |

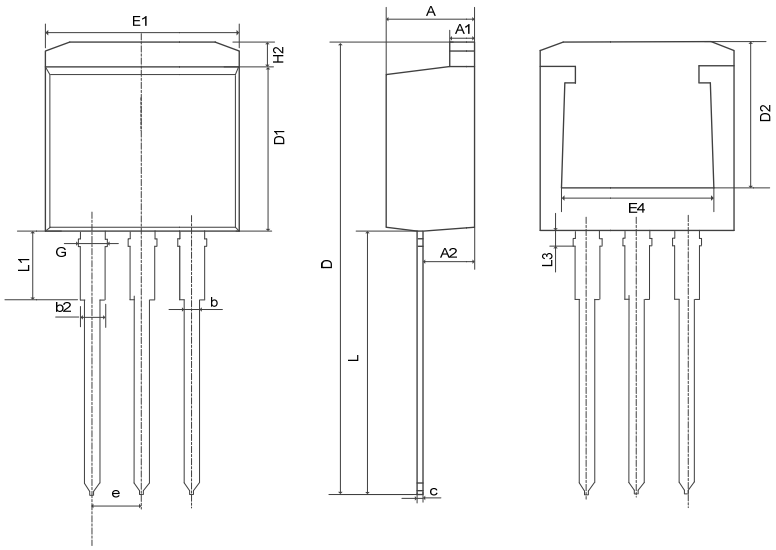
## Mechanical Dimensions for TO-263




COMMON DIMENSIONS

| SYMBOL | MM | |
|---|---|---|
| | MIN | MAX |
| A | 4.37 | 4.89 |
| A1 | 1.17 | 1.42 |
| A2 | 2.19 | 2.89 |
| b | 0.70 | 0.96 |
| b1 | 1.17 | 1.47 |
| c | 0.30 | 0.60 |
| D1 | 8.45 | 9.35 |
| D4 | 6.60 | — |
| E | 9.80 | 10.40 |
| E5 | 7.06 | — |
| e | 2.54BSC | |
| H | 14.70 | 16.00 |
| H2 | 1.07 | 1.47 |
| L | 2.00 | 2.70 |
| L1 | 1.15 | 1.75 |
| L4 | 0.25BSC | |
| θ | 0° | 9° |

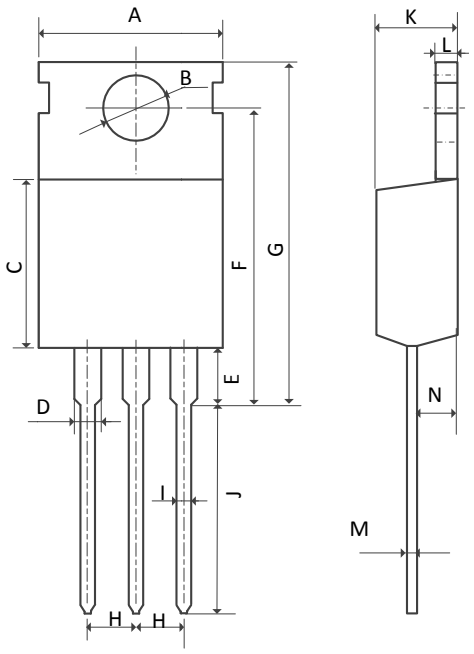
## Mechanical Dimensions for TO-262




COMMON DIMENSIONS

| SYMBOL | MM | |
|---|---|---|
| | MIN | MAX |
| A | 4.37 | 4.90 |
| A1 | 1.17 | 1.42 |
| A2 | 2.49 | 2.89 |
| b | 0.71 | 0.96 |
| b2 | 1.07 | 1.47 |
| c | 0.28 | 0.53 |
| D | 23.20 | 24.02 |
| D1 | 8.45 | 8.90 |
| D2 | 6.00 | — |
| E1 | 9.86 | 10.40 |
| E4 | 7.06 | — |
| e | 2.54BSC | |
| G | 1.25 | 1.50 |
| H2 | — | 1.50 |
| L | 13.33 | 14.16 |
| L1 | 3.50 | 4.00 |
| L3 | 1.28 | 1.58 |

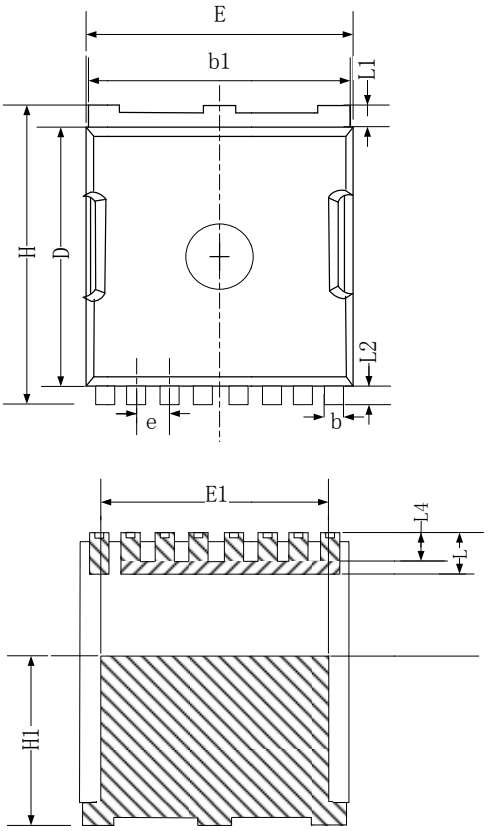
**Mechanical Dimensions for TO-220**




COMMON DIMENSIONS

| SYMBOL | MM | |
|---|---|---|
| | MIN | MAX |
| A | 9.70 | 10.30 |
| B | 3.40 | 3.80 |
| C | 8.80 | 9.40 |
| D | 1.17 | 1.47 |
| E | 2.60 | 3.50 |
| F | 15.10 | 16.90 |
| G | 19.60MAX | |
| H | 2.54REF | |
| I | 0.70 | 0.95 |
| J | 9.25 | 11.00 |
| K | 4.30 | 4.77 |
| L | 1.20 | 1.45 |
| M | 0.40 | 0.65 |
| N | 2.20 | 2.60 |

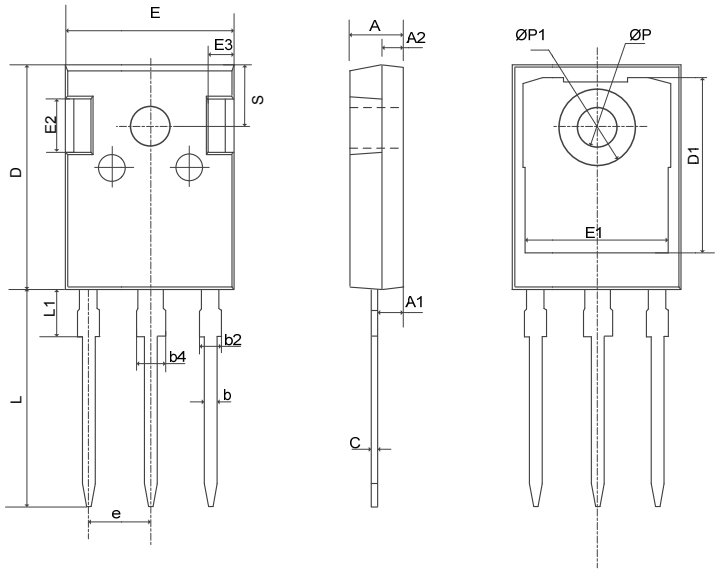
## Mechanical Dimensions for TO-LL




COMMON DIMENSIONS

| SYMBOL | MM | |
|---|---|---|
| | MIN | MAX |
| A | 2.15 | 2.45 |
| b | 0.7 | 0.95 |
| b1 | 9.6 | 9.95 |
| C | 0.4 | 0.6 |
| D | 10.1 | 10.6 |
| E | 9.6 | 10.1 |
| E1 | 7.9 | 8.5 |
| e | 1.20BSC | |
| H | 11.38 | 11.88 |
| H1 | 6.65 | 7.2 |
| L | 1.4 | 2 |
| L1 | 0.5 | 0.9 |
| L2 | 0.48 | 0.72 |
| L4 | 1 | 1.3 |

## Mechanical Dimensions for TO-247



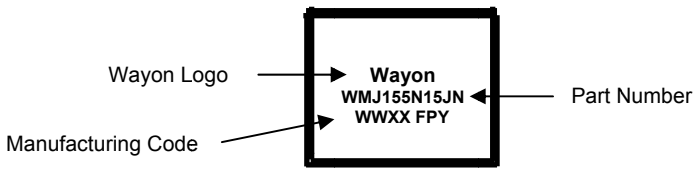

COMMON DIMENSIONS

| SYMBOL | MM | |
|---|---|---|
| | MIN | MAX |
| A | 4.80 | 5.21 |
| A1 | 2.21 | 2.61 |
| A2 | 1.85 | 2.16 |
| b | 1.07 | 1.36 |
| b2 | 1.91 | 2.41 |
| b4 | 2.87 | 3.38 |
| c | 0.51 | 0.75 |
| D | 20.70 | 21.30 |
| D1 | 16.25 | 17.65 |
| E | 15.50 | 16.13 |
| E1 | 12.38 | 13.60 |
| E2 | 3.68 | 5.20 |
| E3 | 1.00 | 2.70 |
| e | 5.44BSC | |
| L | 19.62 | 20.32 |
| L1 | — | 4.40 |
| ØP | 3.40 | 3.80 |
| ØP1 | — | 7.30 |
| S | 6.15BSC | |

## Ordering Information

| Part | Package | Marking | Packing method |
|---|---|---|---|
| WML155N15JN | TO-220F | WML155N15JN | Tube |
| WMK155N15JN | TO-220 | WMK155N15JN | Tube |
| WMN155N15JN | TO-262 | WMN155N15JN | Tube |
| WMM155N15JN | TO-263 | WMM155N15JN | Tape and Reel |
| WMLL155N15JN | TO-LL | WMLL155N15JN | Tape and Reel |
| WMJ155N15JN | TO-247 | WMJ155N15JN | Tube |

## Marking Information




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WAYON website: **http://www.way-on.com**
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