

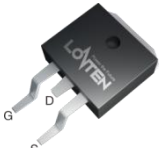
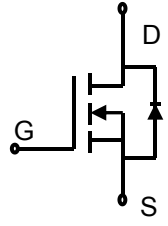



Lonten N-channel 60V, 90A, 7.9mΩ Power MOSFET

| | | | | | | | |
|---|---|-----------|-----|-----------------------------|-------|-------|-----|
| <p>Description These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and with stand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.</p> <p>Features</p> <ul style="list-style-type: none"> ◆ 60V,90A,$R_{DS(ON),max}=7.9m\Omega@V_{GS}=10V$ ◆ Improved dv/dt capability ◆ Fast switching ◆ 100% EAS Guaranteed ◆ Green device available <p>Applications</p> <ul style="list-style-type: none"> ◆ Motor Drives ◆ UPS ◆ DC-DC Converter | <p>Product Summary</p> <table style="width: 100%; border: none;"> <tr> <td style="padding: 2px;">V_{DSS}</td> <td style="padding: 2px;">60V</td> </tr> <tr> <td style="padding: 2px;">$R_{DS(on),max}@V_{GS}=10V$</td> <td style="padding: 2px;">7.9mΩ</td> </tr> <tr> <td style="padding: 2px;">I_D</td> <td style="padding: 2px;">90A</td> </tr> </table> <p>Pin Configuration</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>TO-220</p> </div> <div style="text-align: center;">  <p>TO-220MF</p> </div> </div> <div style="text-align: center; margin-top: 20px;">  <p>TO-263</p> </div> <div style="text-align: right; margin-top: 20px;">  </div> <p style="text-align: center; margin-top: 20px;">N-Channel MOSFET </p> | V_{DSS} | 60V | $R_{DS(on),max}@V_{GS}=10V$ | 7.9mΩ | I_D | 90A |
| V_{DSS} | 60V | | | | | | |
| $R_{DS(on),max}@V_{GS}=10V$ | 7.9mΩ | | | | | | |
| I_D | 90A | | | | | | |

S

Absolute Maximum Ratings $T_C = 25^\circ C$ unless otherwise noted

| Parameter | Symbol | Value | Unit |
|--|-----------|-------------|------------|
| Drain-Source Voltage | V_{DSS} | 60 | V |
| Continuous drain current ($T_C = 25^\circ C$) TO-220/TO-263 | I_D | 90 | A |
| Continuous drain current ($T_C = 100^\circ C$) TO-220/TO-263 | | 57 | A |
| Continuous drain current ($T_C = 25^\circ C$) TO-220MF | I_D | 50 | A |
| Continuous drain current ($T_C = 100^\circ C$) TO-220MF | | 31 | A |
| Pulsed drain current ¹⁾ | I_{DM} | 360 | A |
| Gate-Source voltage | V_{GSS} | ± 20 | V |
| Avalanche energy ²⁾ | E_{AS} | 144 | mJ |
| Power Dissipation ($T_C = 25^\circ C$) TO-220/TO-263 | P_D | 125 | W |
| Power Dissipation ($T_C = 25^\circ C$) TO-220MF | P_D | 38 | W |
| Storage Temperature Range | T_{STG} | -55 to +150 | $^\circ C$ |
| Operating Junction Temperature Range | T_J | -55 to +150 | $^\circ C$ |

Thermal Characteristics

| Parameter | Symbol | Value | Unit |
|--|-----------------|-------|--------------|
| Thermal Resistance, Junction-to-Case TO-220/TO-263 | $R_{\theta JC}$ | 1.0 | $^\circ C/W$ |
| Thermal Resistance, Junction-to-Case TO-220MF | $R_{\theta JC}$ | 3.3 | $^\circ C/W$ |

Package Marking and Ordering Information

| Device | Device Package | Marking |
|-----------|----------------|-----------|
| LNC06R079 | TO-220 | LNC06R079 |
| LND06R079 | TO-220MF | LND06R079 |
| LNE06R079 | TO-263 | LNE06R079 |

Electrical Characteristics
 $T_J = 25^\circ\text{C}$ unless otherwise noted

| Parameter | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|---|--------------|---|------|------|------|---------------|
| Static characteristics | | | | | | |
| Drain-source breakdown voltage | BV_{DSS} | $V_{GS}=0\text{ V}, I_D=250\mu\text{A}$ | 60 | --- | --- | V |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu\text{A}$ | 0.8 | 1.3 | 1.8 | V |
| Drain-source leakage current | I_{DSS} | $V_{DS}=60\text{V}, V_{GS}=0\text{V}, T_J = 25^\circ\text{C}$ | --- | --- | 1 | μA |
| | | $V_{DS}=48\text{V}, V_{GS}=0\text{V}, T_J = 125^\circ\text{C}$ | --- | --- | 30 | μA |
| Gate leakage current, Forward | I_{GSSF} | $V_{GS}=20\text{V}, V_{DS}=0\text{ V}$ | --- | --- | 100 | nA |
| Gate leakage current, Reverse | I_{GSSR} | $V_{GS}=-20\text{V}, V_{DS}=0\text{ V}$ | --- | --- | -100 | nA |
| Drain-source on-state resistance | $R_{DS(on)}$ | $V_{GS}=10\text{V}, I_D=30\text{A}$ | --- | 6.5 | 7.9 | m Ω |
| | | $V_{GS}=4.5\text{V}, I_D=20\text{A}$ | --- | 7.6 | 9.5 | m Ω |
| Forward transconductance | g_{fs} | $V_{DS} = 5\text{V}, I_D=30\text{A}$ | --- | 92 | --- | S |
| Dynamic characteristics | | | | | | |
| Input capacitance | C_{iss} | $V_{DS} = 25\text{V}, V_{GS} = 0\text{V},$ $F = 1\text{MHz}$ | --- | 3752 | --- | pF |
| Output capacitance | C_{oss} | | --- | 269 | --- | |
| Reverse transfer capacitance | C_{rss} | | --- | 206 | --- | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD} = 30\text{V}, V_{GS}=10\text{V}, I_D = 25\text{A}$ | --- | 16.5 | --- | ns |
| Rise time | t_r | | --- | 170 | --- | |
| Turn-off delay time | $t_{d(off)}$ | | --- | 464 | --- | |
| Fall time | t_f | | --- | 140 | --- | |
| Gate resistance | R_g | $V_{GS}=0\text{V}, V_{DS}=0\text{V}, F=1\text{MHz}$ | --- | 2.95 | --- | Ω |
| Gate charge characteristics | | | | | | |
| Gate to source charge | Q_{gs} | $V_{DS}=48\text{V}, I_D=25\text{A},$ $V_{GS}= 10\text{V}$ | --- | 11.7 | --- | nC |
| Gate to drain charge | Q_{gd} | | --- | 13.1 | --- | |
| Gate charge total | Q_g | | --- | 69 | --- | |
| Drain-Source diode characteristics and Maximum Ratings | | | | | | |
| Continuous Source Current | I_S | | --- | --- | 90 | A |
| Pulsed Source Current ³⁾ | I_{SM} | | --- | --- | 360 | A |
| Diode Forward Voltage | V_{SD} | $V_{GS}=0\text{V}, I_S=20\text{A}, T_J=25^\circ\text{C}$ | --- | --- | 1.2 | V |
| Reverse Recovery Time | t_{rr} | $I_S=25\text{A}, di/dt=100\text{A}/\mu\text{s}, T_J=25^\circ\text{C}$ | --- | 26.8 | --- | ns |
| Reverse Recovery Charge | Q_{rr} | | --- | 29 | --- | nC |

Notes:

- 1: Repetitive Rating: Pulse width limited by maximum junction temperature.
- 2: $V_{DD}=25\text{V}, V_{GS}=10\text{V}, L=0.5\text{mH}, I_{AS}=24\text{A}, R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$.
- 3: Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.

Electrical Characteristics Diagrams

Figure 1. Typ. Output Characteristics

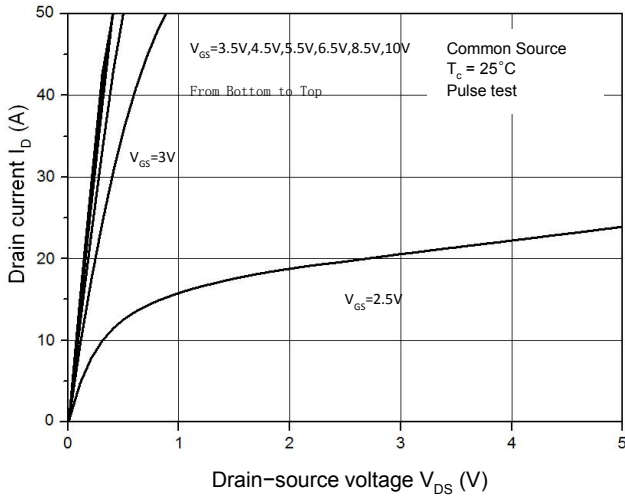


Figure 2. Transfer Characteristics

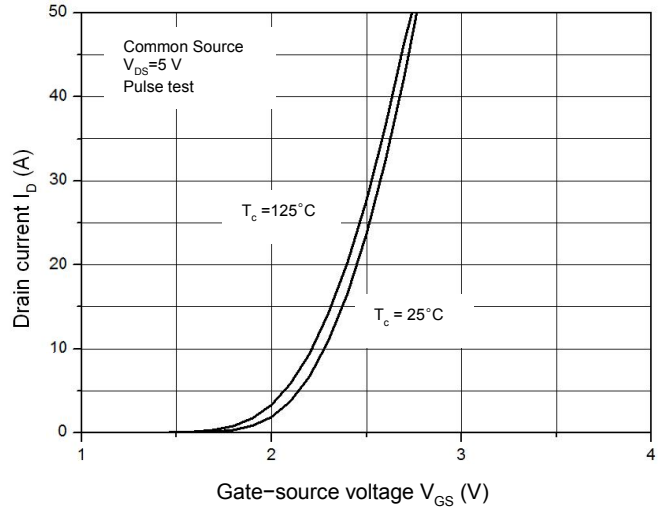


Figure 3. Capacitance Characteristics

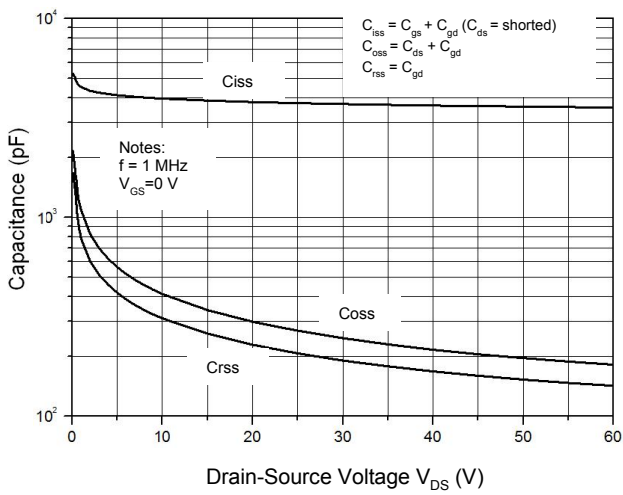


Figure 4. Gate Charge Waveform

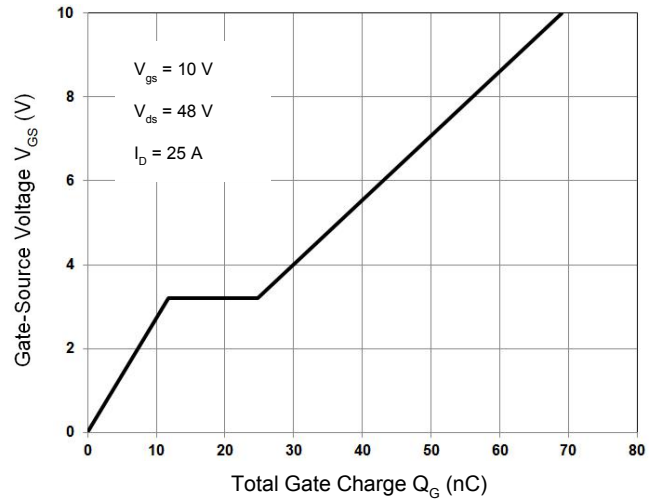


Figure 5. Body-Diode Characteristics

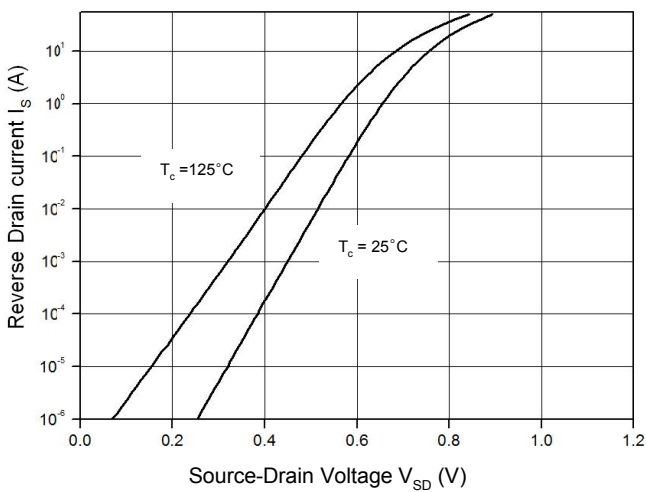


Figure 6. Rdson-Drain Current

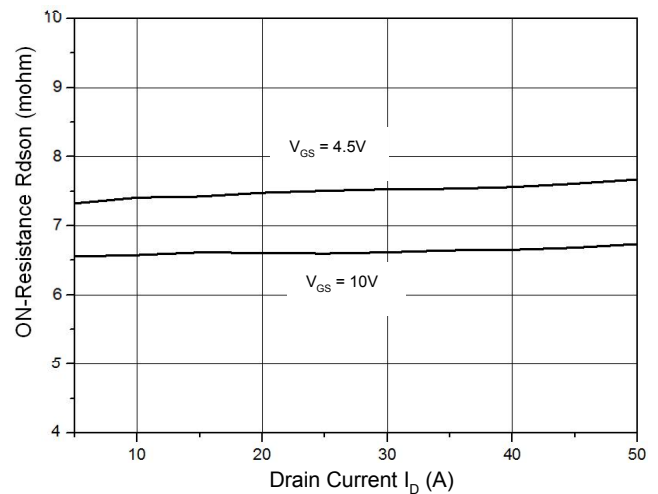


Figure 7. $R_{ds(on)}$ -Junction Temperature($^{\circ}\text{C}$)

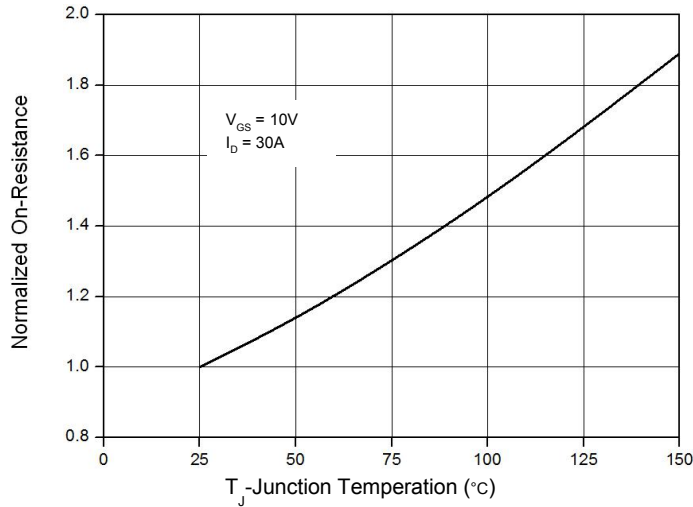


Figure 8. Maximum Safe Operating Area

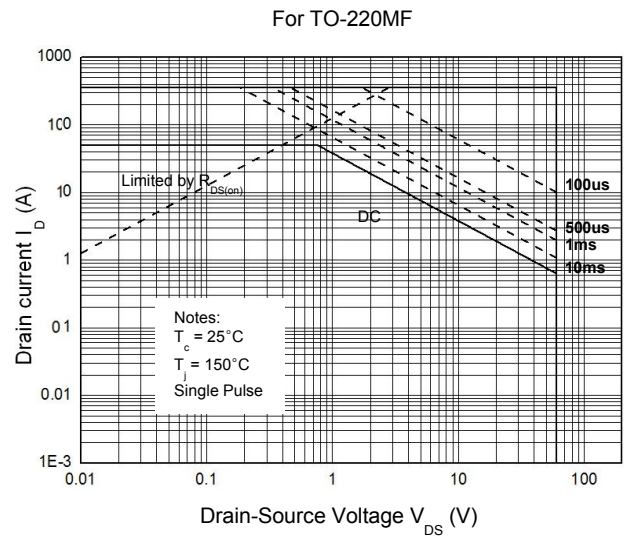
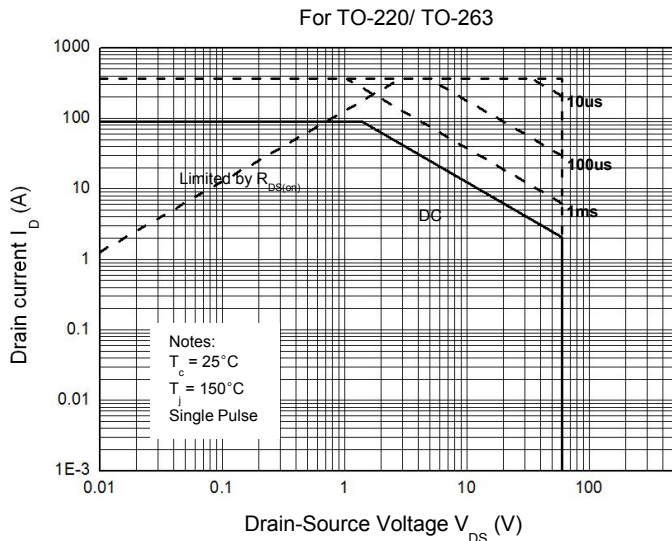
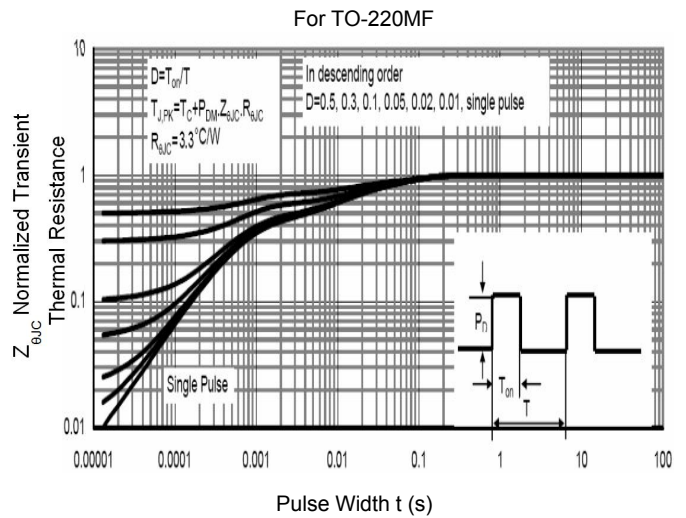
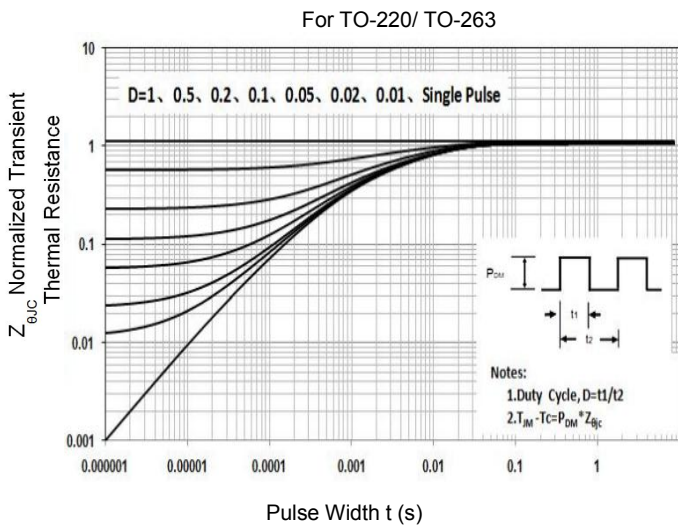


Figure 9. Normalized Maximum Transient Thermal Impedance ($R_{th(jc)}$)



Test Circuit & Waveform

Figure 8. Gate Charge Test Circuit & Waveform

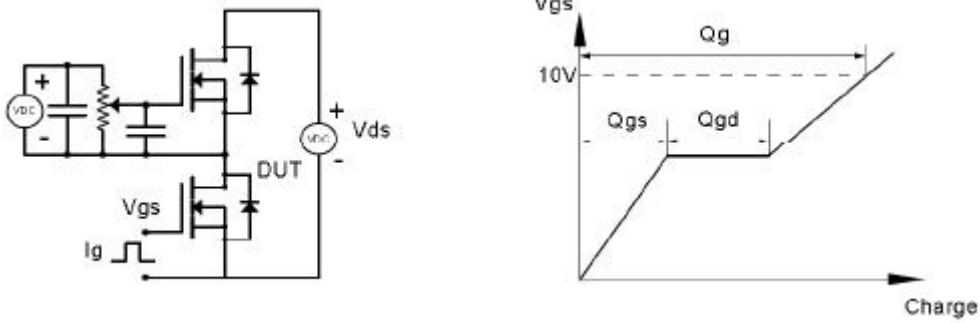


Figure 9. Resistive Switching Test Circuit & Waveforms

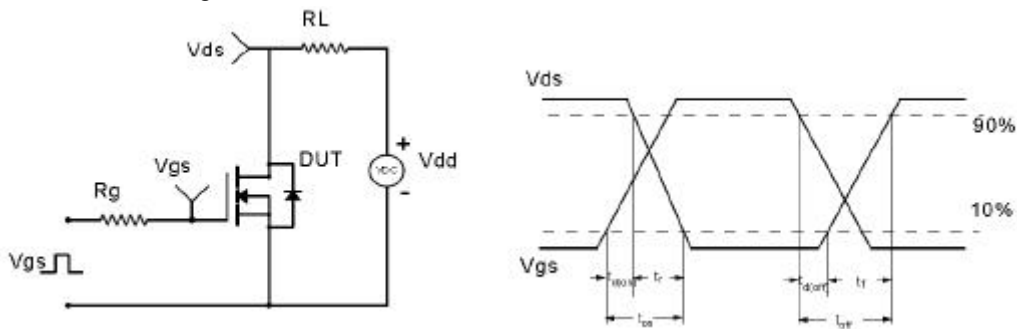


Figure 10. Unclamped Inductive Switching (UIS) Test Circuit & Waveform

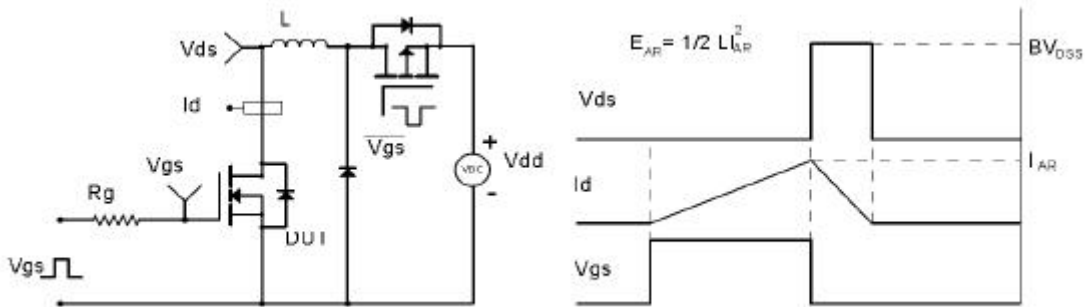
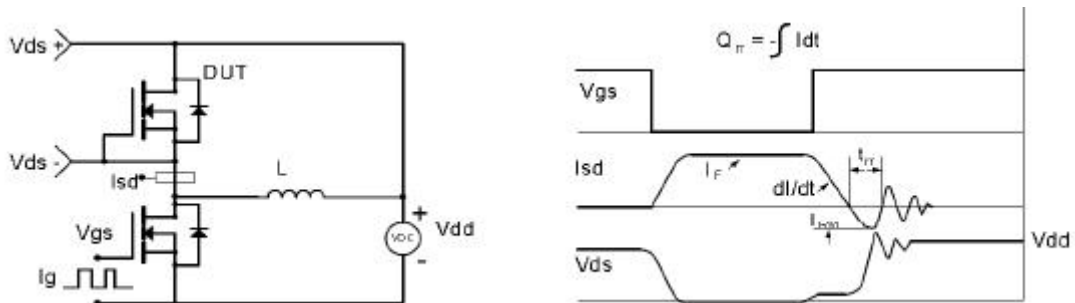
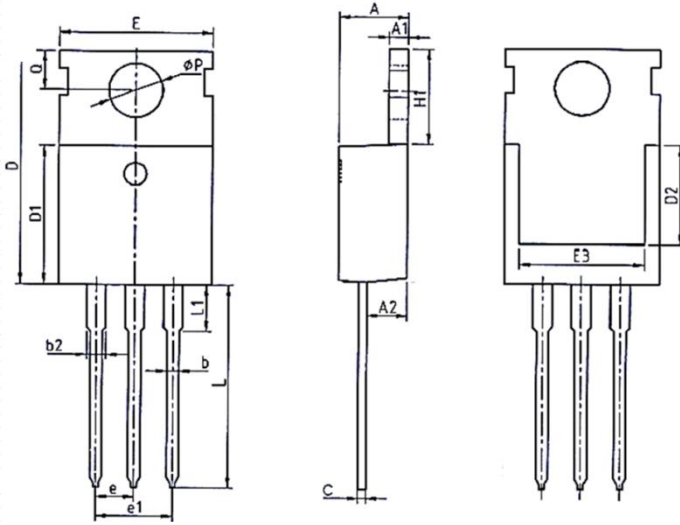


Figure 11. Diode Recovery Circuit & Waveform

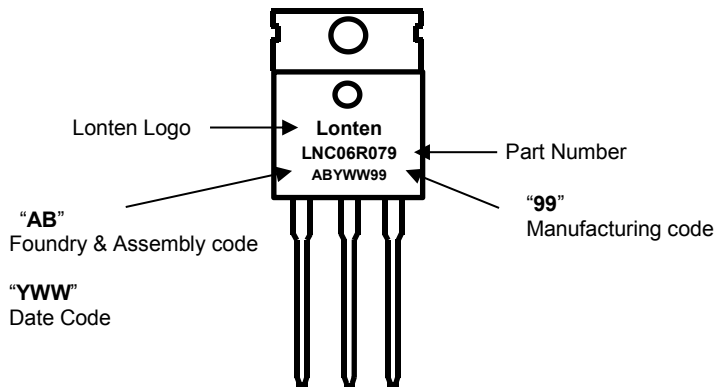


TO-220 PACKAGE INFORMATION

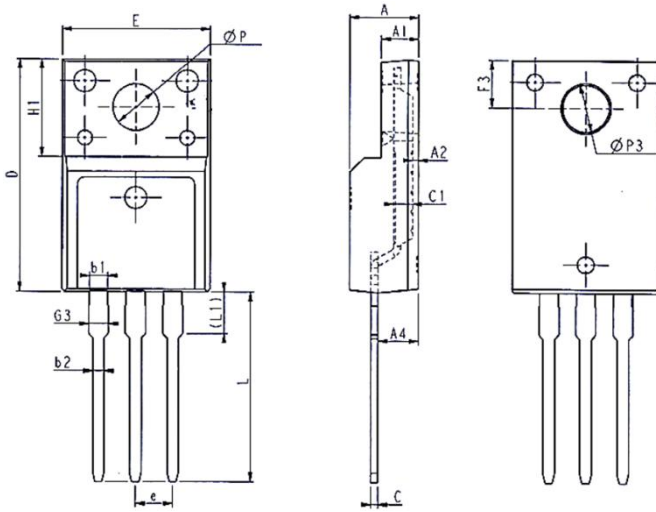


| SYMBOL | COMMON DIMENSIONS | | | | | |
|--------|-------------------|-------|-------|--------|-------|-------|
| | MM | | | INCH | | |
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 4.37 | 4.57 | 4.70 | 0.172 | 0.180 | 0.185 |
| A1 | 1.25 | 1.30 | 1.40 | 0.049 | 0.051 | 0.055 |
| A2 | 2.20 | 2.40 | 2.60 | 0.087 | 0.094 | 0.102 |
| b | 0.70 | 0.80 | 0.95 | 0.028 | 0.031 | 0.037 |
| b2 | 1.17 | 1.27 | 1.47 | 0.046 | 0.050 | 0.058 |
| c | 0.45 | 0.50 | 0.60 | 0.018 | 0.020 | 0.024 |
| D | 15.10 | 15.60 | 16.10 | 0.594 | 0.614 | 0.634 |
| D1 | 8.80 | 9.10 | 9.40 | 0.346 | 0.358 | 0.370 |
| D2 | 5.50 | - | - | 0.217 | - | - |
| E | 9.70 | 10.00 | 10.30 | 0.382 | 0.394 | 0.406 |
| E3 | 7.00 | - | - | 0.276 | - | - |
| e | 2.54BCS | | | 0.1BSC | | |
| e1 | 5.08BCS | | | 0.2REF | | |
| H1 | 6.25 | 6.50 | 6.85 | 0.246 | 0.256 | 0.270 |
| L | 12.75 | 13.50 | 13.80 | 0.502 | 0.531 | 0.543 |
| L1 | - | 3.10 | 3.40 | - | 0.122 | 0.134 |
| ØP | 3.40 | 3.60 | 3.80 | 0.134 | 0.142 | 0.150 |
| Q | 2.60 | 2.80 | 3.00 | 0.102 | 0.110 | 0.118 |

TO-220 Part Marking Information

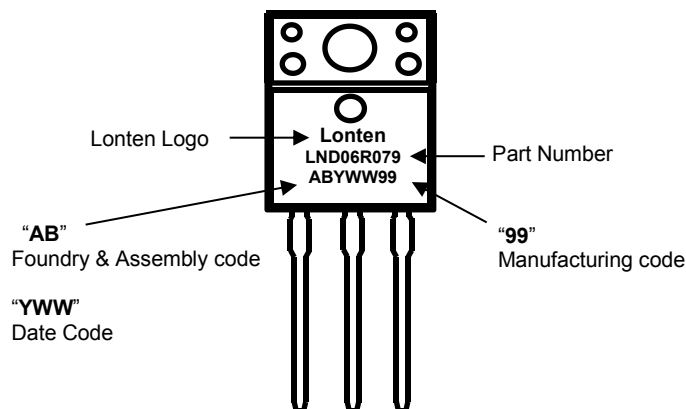


Mechanical Dimensions for TO-220MF

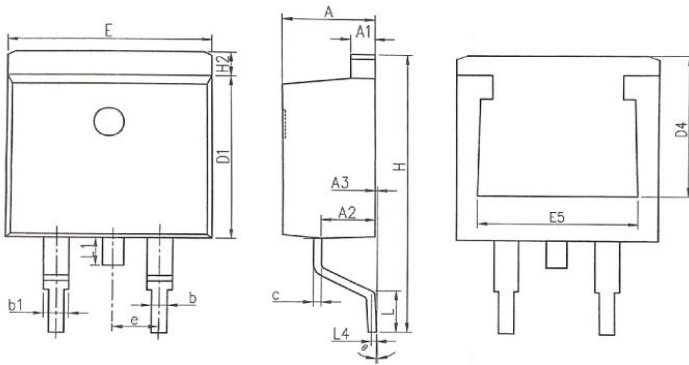


| COMMON DIMENSIONS | | | | | | |
|-------------------|---------|-------|-------|----------|-------|-------|
| SYMBOL | MM | | | INCH | | |
| | MIN | NOM | MAX | MIN | NOM | MAX |
| E | 9.96 | 10.16 | 10.36 | 0.392 | 0.400 | 0.408 |
| A | 4.50 | 4.70 | 4.90 | 0.177 | 0.185 | 0.193 |
| A1 | 2.34 | 2.54 | 2.74 | 0.092 | 0.100 | 0.108 |
| A2 | 0.30 | 0.45 | 0.60 | 0.012 | 0.018 | 0.024 |
| A4 | 2.56 | 2.76 | 2.96 | 0.101 | 0.109 | 0.117 |
| c | 0.40 | 0.50 | 0.65 | 0.016 | 0.020 | 0.026 |
| c1 | 1.20 | 1.30 | 1.35 | 0.047 | 0.051 | 0.053 |
| D | 15.57 | 15.87 | 16.17 | 0.613 | 0.625 | 0.637 |
| H1 | 6.70REF | | | 0.264REF | | |
| e | 2.54BSC | | | 0.1BSC | | |
| L | 12.68 | 12.98 | 13.28 | 0.499 | 0.511 | 0.523 |
| L1 | 2.88 | 3.03 | 3.18 | 0.113 | 0.119 | 0.125 |
| ØP | 3.03 | 3.18 | 3.38 | 0.119 | 0.125 | 0.133 |
| ØP3 | 3.15 | 3.45 | 3.65 | 0.124 | 0.136 | 0.144 |
| F3 | 3.15 | 3.30 | 3.45 | 0.124 | 0.130 | 0.136 |
| G3 | 1.25 | 1.35 | 1.55 | 0.049 | 0.053 | 0.061 |
| b1 | 1.18 | 1.28 | 1.43 | 0.046 | 0.050 | 0.056 |
| b2 | 0.70 | 0.80 | 0.95 | 0.028 | 0.031 | 0.037 |

TO-220MF Part Marking Information

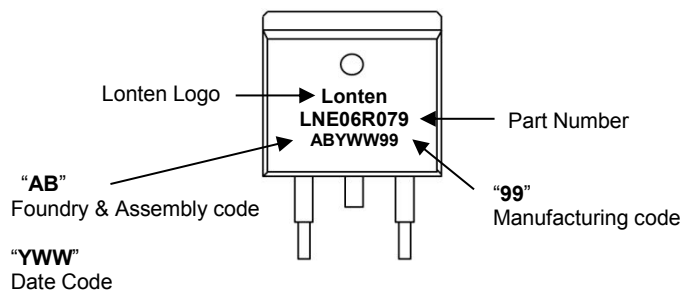


TO-263 PACKAGE INFORMATION



| COMMON DIMENSIONS | | | | | | |
|-------------------|----------|-------|-------|-----------|-------|-------|
| SYMBOL | MM | | | INCH | | |
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 4.37 | 4.57 | 4.77 | 0.172 | 0.180 | 0.188 |
| A1 | 1.22 | 1.27 | 1.42 | 0.048 | 0.050 | 0.056 |
| A2 | 2.49 | 2.69 | 2.89 | 0.098 | 0.106 | 0.114 |
| A3 | 0.00 | 0.13 | 0.25 | 0.000 | 0.005 | 0.010 |
| b | 0.70 | 0.81 | 0.96 | 0.028 | 0.032 | 0.038 |
| b1 | 1.17 | 1.27 | 1.47 | 0.046 | 0.050 | 0.058 |
| c | 0.30 | 0.38 | 0.53 | 0.012 | 0.015 | 0.021 |
| D1 | 8.50 | 8.70 | 8.90 | 0.335 | 0.343 | 0.350 |
| D4 | 6.60 | — | — | 0.260 | — | — |
| E | 9.86 | 10.16 | 10.36 | 0.388 | 0.400 | 0.408 |
| E5 | 7.06 | — | — | 0.278 | — | — |
| e | 2.54 BSC | | | 0.100 BSC | | |
| H | 14.70 | 15.10 | 15.50 | 0.579 | 0.594 | 0.610 |
| H2 | 1.07 | 1.27 | 1.47 | 0.042 | 0.050 | 0.058 |
| L | 2.00 | 2.30 | 2.60 | 0.079 | 0.091 | 0.102 |
| L1 | 1.40 | 1.55 | 1.70 | 0.055 | 0.061 | 0.067 |
| L4 | 0.25 BSC | | | 0.010 BSC | | |
| θ | 0° | 5° | 9° | 0° | 5° | 9° |

TO-263 Part Marking Information



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