

Lonten N-channel 60 V, 80 A, 3.4mΩ Power MOSFET

Features

- Extremely low on-resistance $R_{DS(on)}$
- Excellent $Q_g \times R_{DS(on)}$ product(FOM)
- Qualified according to JEDEC criteria

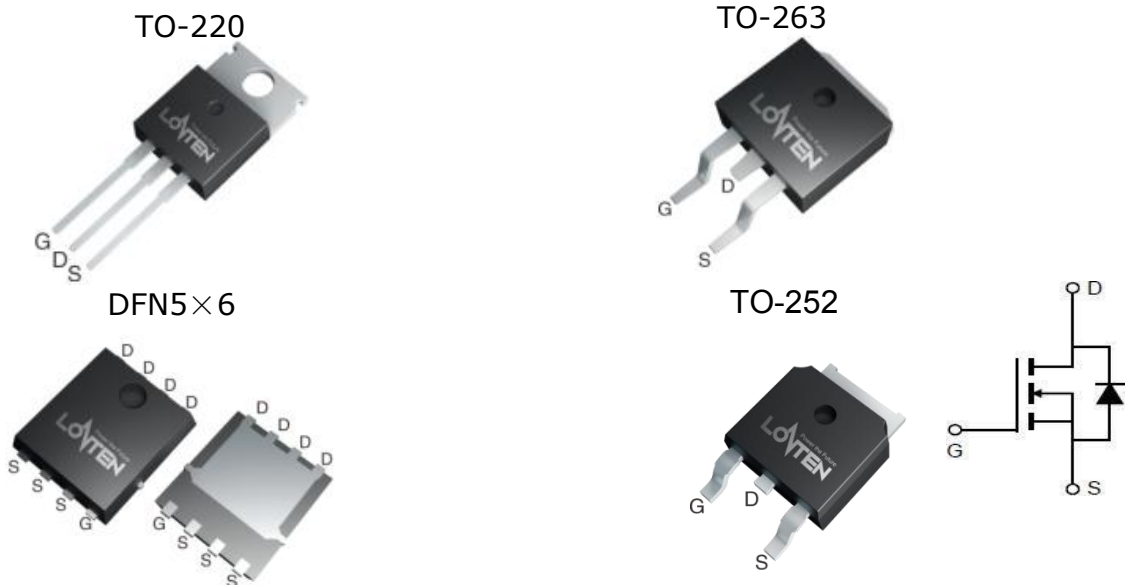
Product Summary

| | |
|-----------------------|-------|
| V_{DS} | 60V |
| $R_{DS(on)@10V}$ typ | 2.8mΩ |
| $R_{DS(on)@4.5V}$ typ | 3.6mΩ |
| I_D | 80A |

Applications

- Synchronous Rectification for AC/DC QuickCharger
- Battery management
- UPS (Uninterruptible Power Supplies)

100% Avalanche Tested



Absolute Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---|----------------|------------|------------------|
| Drain-source voltage | V_{DS} | 60 | V |
| Continuous drain current | I_D | 80 | A |
| $T_C = 25^\circ\text{C}$ (Package limit) | | 117 | |
| $T_C = 25^\circ\text{C}$ (Silicon limit) | | 74 | |
| Pulsed drain current ($T_C = 25^\circ\text{C}$, t_p limited by T_{jmax}) | $I_{D\ pulse}$ | 320 | A |
| Avalanche energy, single pulse ($L=0.3\text{mH}$, $R_g=25\Omega$) | E_{AS} | 135 | mJ |
| Gate-Source voltage | V_{GS} | ± 20 | V |
| Power dissipation ($T_C = 25^\circ\text{C}$) | P_{tot} | 79.1 | W |
| Operating junction and storage temperature | T_j, T_{stg} | -55...+150 | $^\circ\text{C}$ |

Thermal Resistance

| Parameter | Symbol | Max | Unit |
|--|------------|------|------|
| Thermal resistance, junction – case. | R_{thJC} | 1.58 | °C/W |
| Thermal resistance, junction – ambient | R_{thJA} | 47.0 | |

Package Marking and Ordering Information

| Device | Device Package | Marking |
|--------------|----------------|--------------|
| LSGC06R034W3 | TO-220 | LSGC06R034W3 |
| LSGE06R034W3 | TO-263 | LSGE06R034W3 |
| LSGN06R034W3 | DFN5×6 | SGN06R034W3 |
| LSGG06R034W3 | TO-252 | SGG06R034W3 |

Electrical Characteristic (at $T_j = 25\text{ °C}$, unless otherwise specified)

| Parameter | Symbol | Value | | | Unit | Test Condition |
|-----------|--------|-------|------|------|------|----------------|
| | | min. | typ. | max. | | |

Static Characteristic

| | | | | | | |
|----------------------------------|--------------|-----|------|-----|------------|--|
| Drain-source breakdown voltage | BV_{DSS} | 60 | 66 | - | V | $V_{GS}=0V, I_D=250\mu A$ |
| Gate threshold voltage | $V_{GS(th)}$ | 1.2 | 1.7 | 2.2 | V | $V_{DS}=V_{GS}, I_D=250\mu A$ |
| Zero gate voltage drain current | I_{DSS} | - | 0.02 | 1 | μA | $V_{DS}=60V, V_{GS}=0V$ $T_j=25\text{ °C}$ $T_j=125\text{ °C}$ |
| Gate-source leakage current | I_{GSS} | - | 10 | 100 | nA | $V_{GS}=20V, V_{DS}=0V$ |
| Drain-source on-state resistance | $R_{DS(on)}$ | - | 2.8 | 3.4 | m Ω | $V_{GS}=10V, I_D=20A$ |
| | | - | 3.6 | 4.4 | | $V_{GS}=4.5V, I_D=20A$ |
| Transconductance | g_{fs} | - | 102 | - | S | $V_{DS}=5V, I_D=20A$ |

Dynamic Characteristic

| | | | | | | |
|------------------------------|-----------|---|------|---|----|--|
| Input Capacitance | C_{iss} | - | 3224 | - | pF | $V_{GS}=0V, V_{DS}=30V,$ $f=1MHz$ |
| Output Capacitance | C_{oss} | - | 1050 | - | | |
| Reverse Transfer Capacitance | C_{rss} | - | 34 | - | | |
| Gate Total Charge | Q_G | - | 54.2 | - | nC | $V_{GS}=10V, V_{DS}=30V,$ $I_D=20A, f=1MHz$ |
| Gate-Source charge | Q_{gs} | - | 10.2 | - | | |
| Gate-Drain charge | Q_{gd} | - | 7.8 | - | | |

| | | | | | | |
|---------------------|--------------|---|------|---|----------|---|
| Turn-on delay time | $t_{d(on)}$ | - | 11.6 | - | ns | $V_{GS}=10V, V_{DD}=30V,$ $R_{G_ext}=2.7\Omega$ |
| Rise time | t_r | - | 46.5 | - | | |
| Turn-off delay time | $t_{d(off)}$ | - | 47 | - | | |
| Fall time | t_f | - | 58 | - | | |
| Gate resistance | R_G | - | 2.2 | - | Ω | $V_{GS}=0V, V_{DS}=0V,$ $f=1MHz$ |

Body Diode Characteristic

| Parameter | Symbol | Value | | | Unit | Test Condition |
|------------------------------------|----------|-------|------|------|------|--------------------------------|
| | | min. | typ. | max. | | |
| Body Diode Forward Voltage | V_{SD} | - | 0.66 | 0.8 | V | $V_{GS}=0V, I_{SD}=1A$ |
| Body Diode Reverse Recovery Time | t_{rr} | - | 34 | - | ns | $I_F=20A, dI/dt=400A/\mu$ s |
| Body Diode Reverse Recovery Charge | Q_{rr} | - | 100 | - | nC | |

Typical Performance Characteristics

Fig 1: Output Characteristics

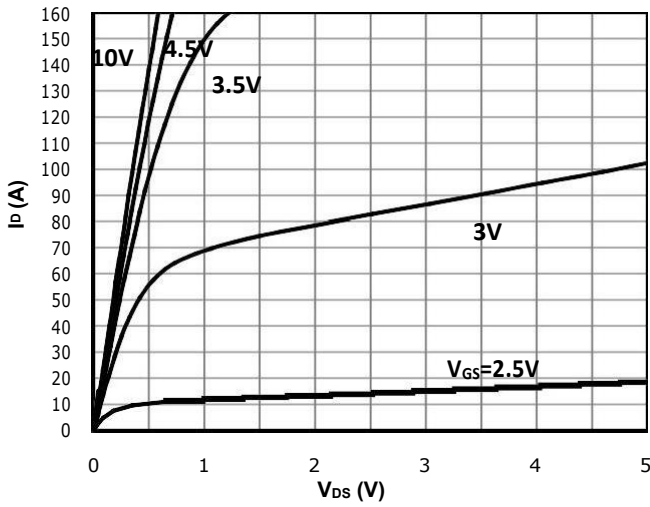


Fig 2: Transfer Characteristics

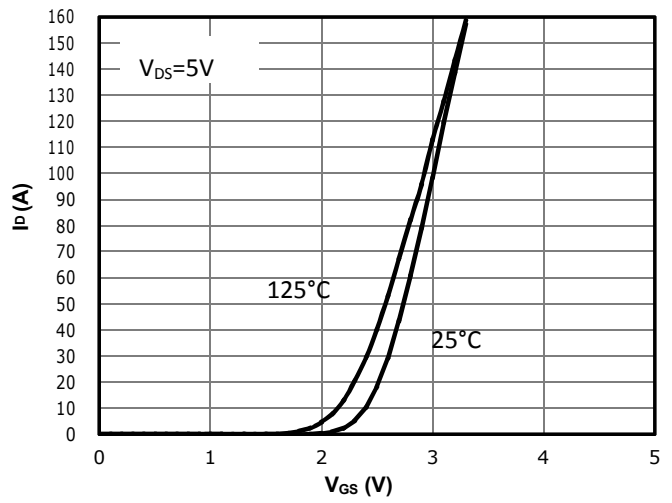


Fig3: $R_{ds(on)}$ vs Drain Current and Gate Voltage

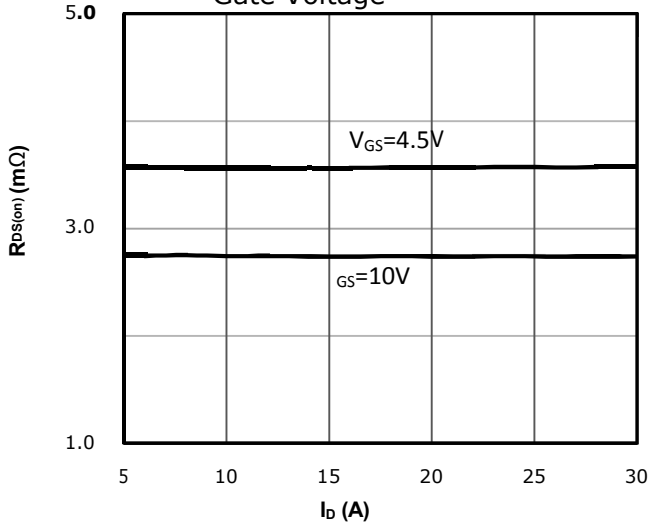


Fig 4: $R_{ds(on)}$ vs Gate Voltage

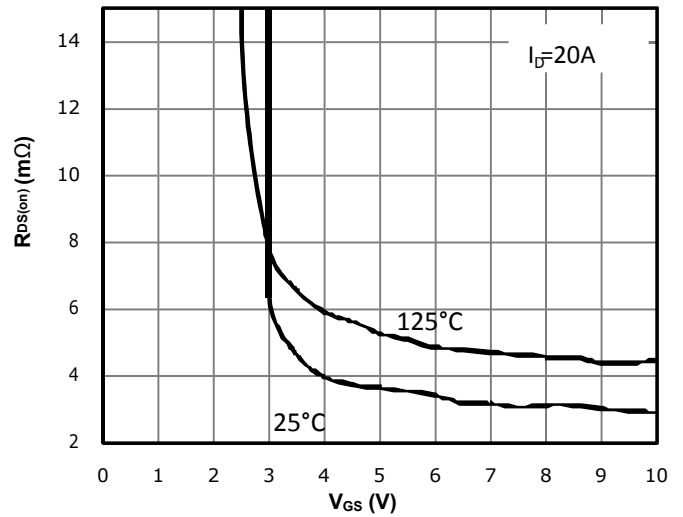


Fig5: $R_{ds(on)}$ vs. Temperature

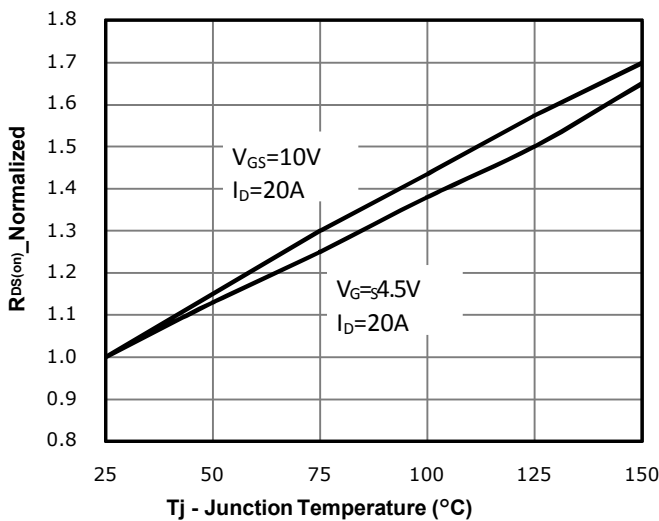


Fig 6: Capacitance Characteristics

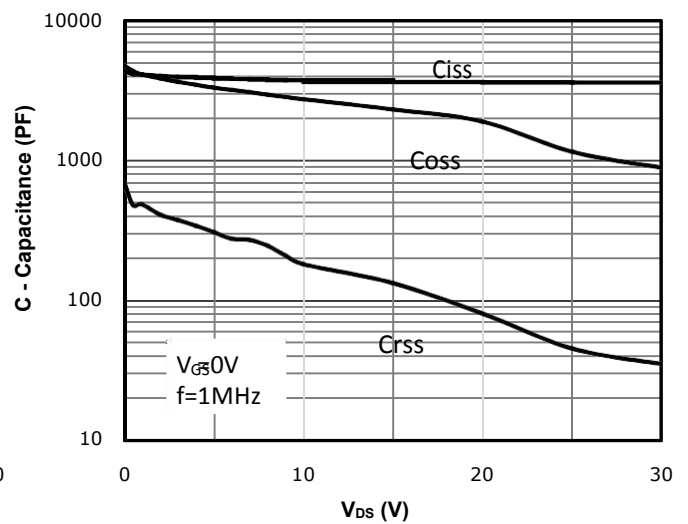


Fig 7: Gate Charge Characteristics

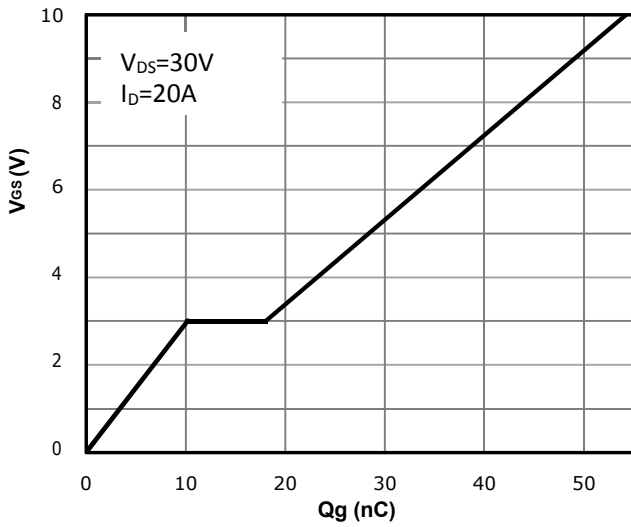


Fig 8: Body-diode Forward Characteristics

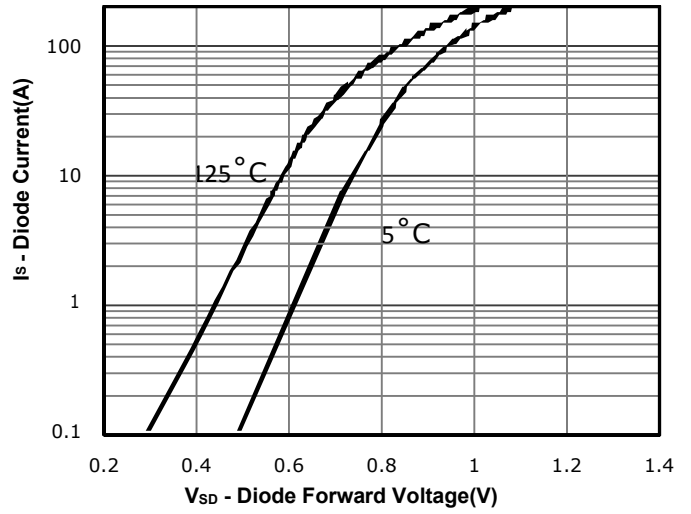


Fig 9: Power Dissipation

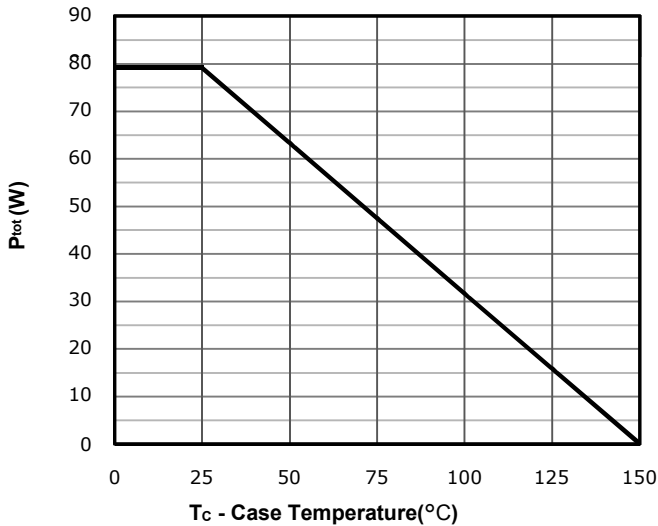


Fig 10: Drain Current Derating

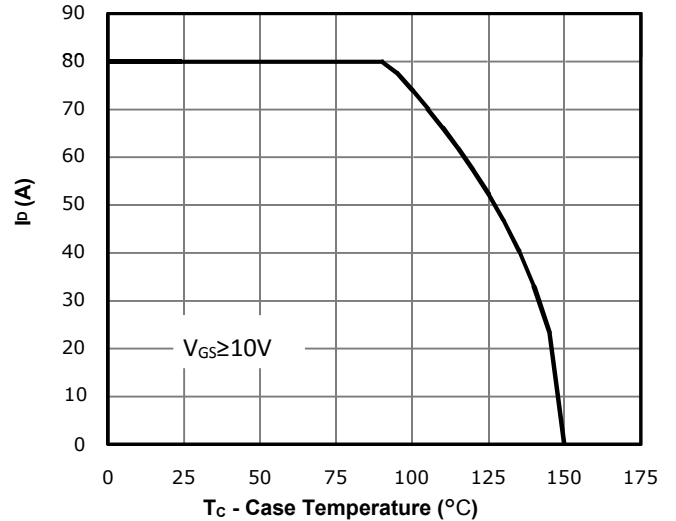


Fig 11: Safe Operating Area

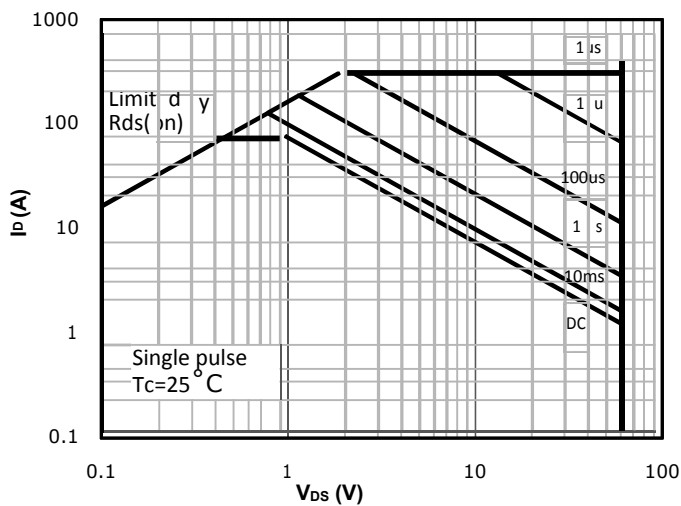
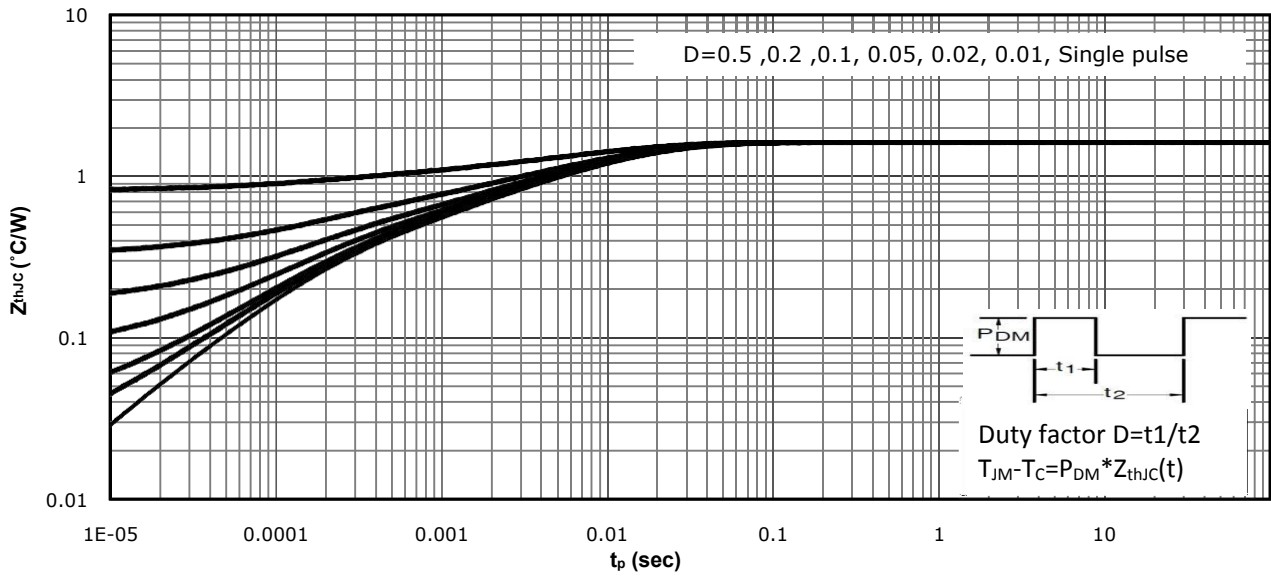
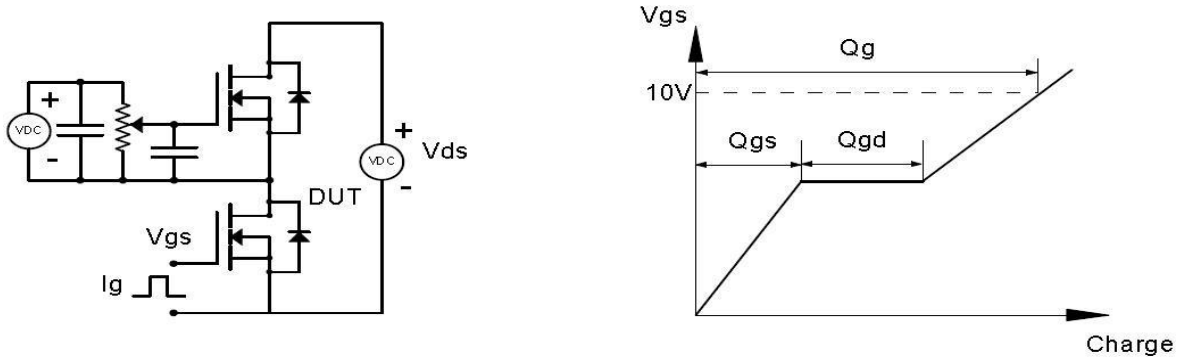


Fig 12: Max. Transient Thermal Impedance

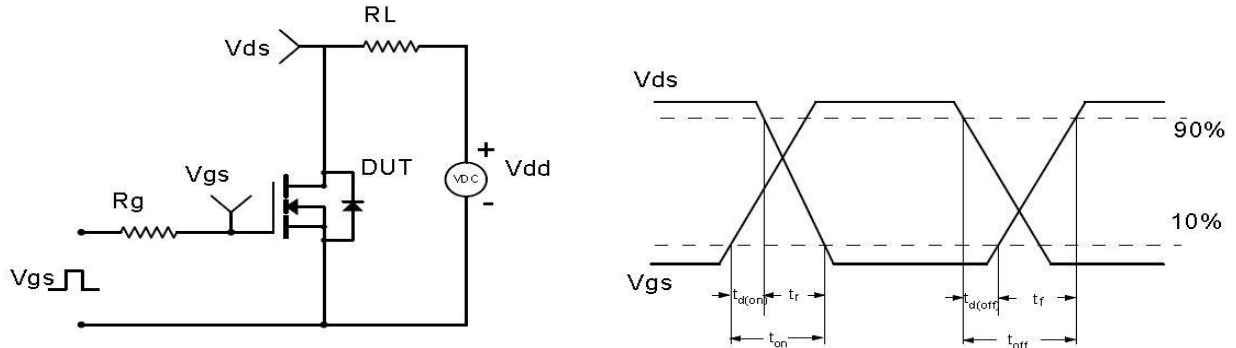


Test Circuit & Waveform

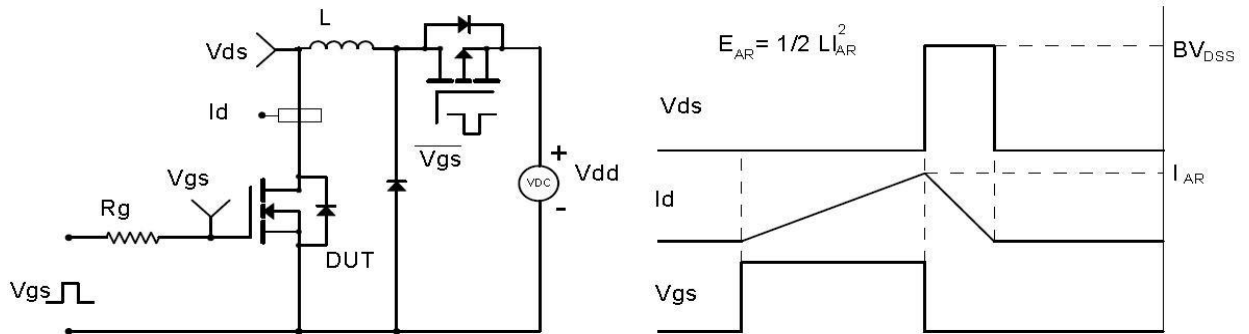
Gate Charge Test Circuit & Waveform



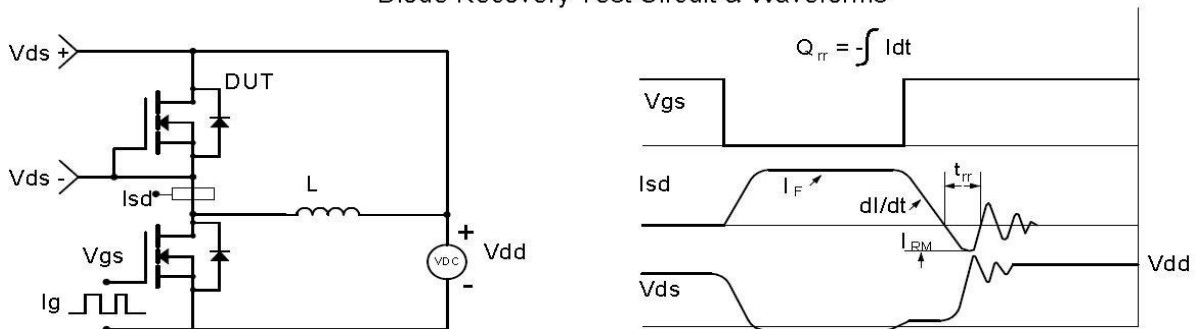
Resistive Switching Test Circuit & Waveforms



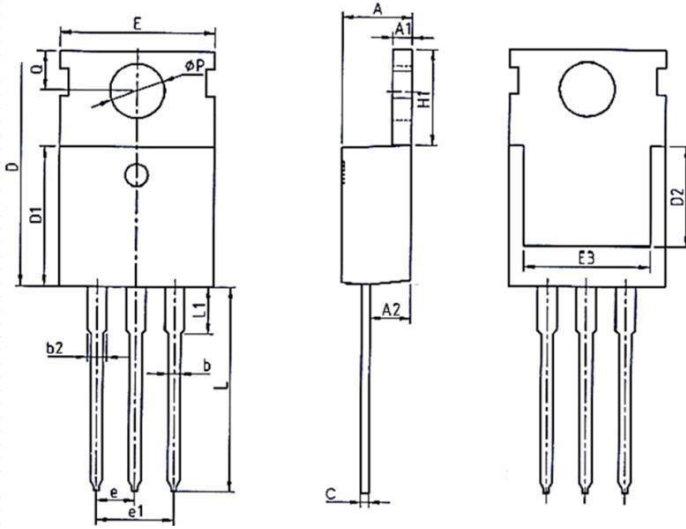
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

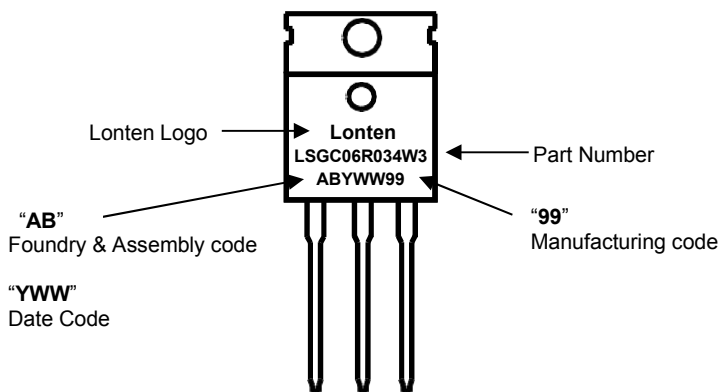


Mechanical Dimensions for TO-220



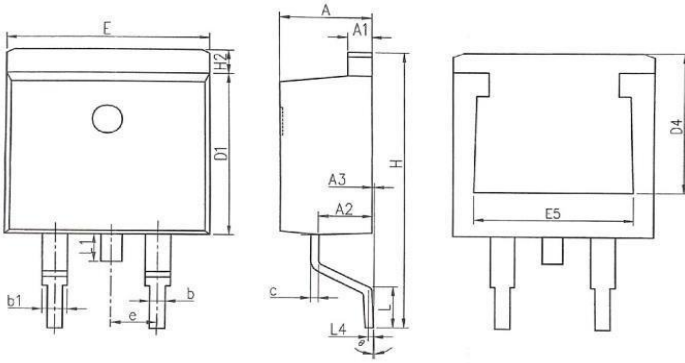
| COMMON DIMENSIONS | | | | | | |
|-------------------|---------|-------|-------|--------|-------|-------|
| SYMBOL | MM | | | INCH | | |
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 4.37 | 4.57 | 4.70 | 0.172 | 0.180 | 0.185 |
| A1 | 1.25 | 1.30 | 1.40 | 0.049 | 0.051 | 0.055 |
| A2 | 2.20 | 2.40 | 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



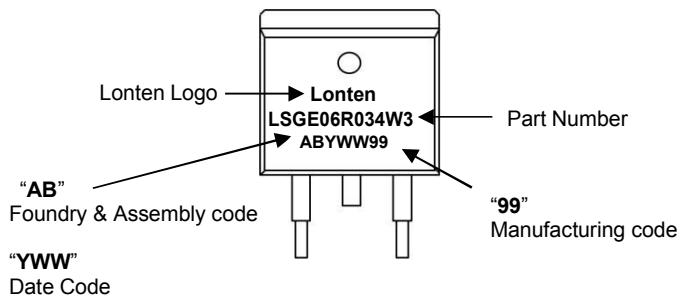
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|---------------|-----------|---------------|-----------|
| 2019 | H | Workweek 02 | 02 |
| 2020 | I | Workweek 03 | 03 |
| 2021 | J | Workweek 04 | 04 |
| 2022 | K | Workweek 05 | 05 |
| 2023 | L | Workweek 06 | 06 |
| 2024 | M | | |

Mechanical Dimensions for TO-263



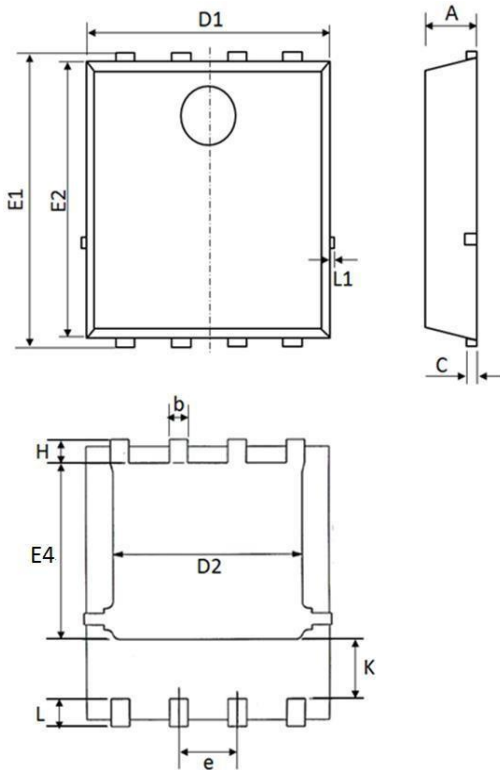
| COMMON DIMENSIONS | | | | | | |
|-------------------|----------|-------|-------|-----------|-------|-------|
| SYMBOL | MM | | | INCH | | |
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 4.37 | 4.57 | 4.77 | 0.172 | 0.180 | 0.188 |
| A1 | 1.22 | 1.27 | 1.42 | 0.048 | 0.050 | 0.056 |
| A2 | 2.49 | 2.69 | 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



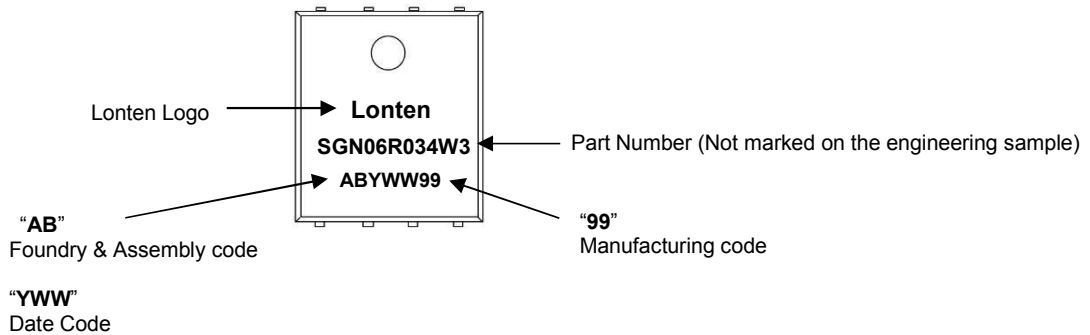
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|---------------|-----------|---------------|-----------|
| 2019 | H | Workweek 02 | 02 |
| 2020 | I | Workweek 03 | 03 |
| 2021 | J | Workweek 04 | 04 |
| 2022 | K | Workweek 05 | 05 |
| 2023 | L | Workweek 06 | 06 |
| 2024 | M | | |

Mechanical Dimensions for DFN5×6



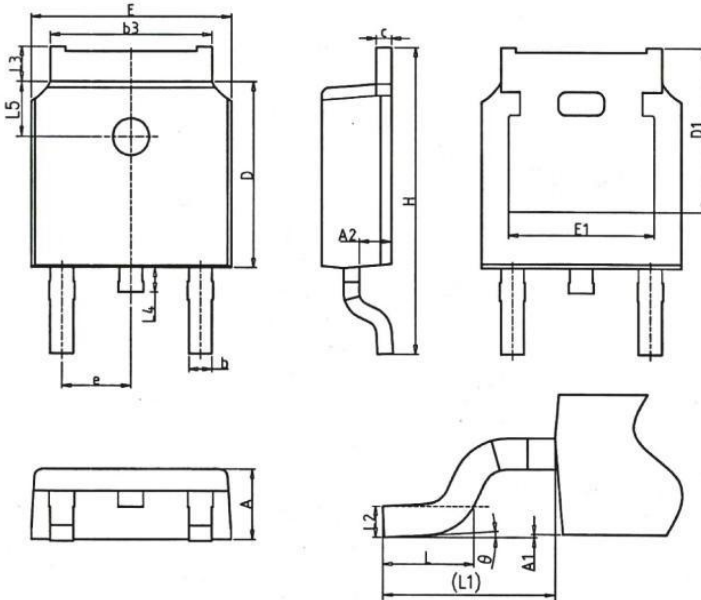
| COMMON DIMENSIONS | | | | | | |
|-------------------|-------------|-------|-------|-----------|-------|-------|
| SYMBOL | MILLIMETERS | | | INCHS | | |
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 1 | 1.1 | 1.2 | 0.039 | 0.043 | 0.047 |
| b | 0.3 | 0.4 | 0.5 | 0.012 | 0.016 | 0.020 |
| C | 0.154 | 0.254 | 0.354 | 0.006 | 0.010 | 0.014 |
| D1 | 5 | 5.2 | 5.4 | 0.197 | 0.205 | 0.213 |
| D2 | 3.8 | 4.1 | 4.25 | 0.150 | 0.161 | 0.167 |
| E1 | 5.95 | 6.15 | 6.35 | 0.234 | 0.242 | 0.250 |
| E2 | 5.66 | 5.86 | 6.06 | 0.223 | 0.231 | 0.239 |
| E4 | 3.52 | 3.72 | 3.92 | 0.139 | 0.146 | 0.154 |
| e | 1.27 BSC | | | 0.050 BSC | | |
| H | 0.4 | 0.5 | 0.6 | 0.016 | 0.020 | 0.024 |
| L | 0.5 | 0.6 | 0.7 | 0.020 | 0.024 | 0.028 |
| L1 | - | - | 0.12 | - | - | 0.005 |
| K | 1.14 | 1.29 | 1.44 | 0.045 | 0.051 | 0.057 |

DFN5×6 Part Marking Information



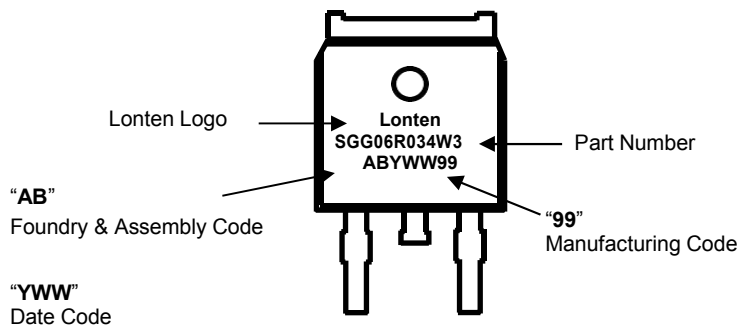
| Calendar Year | Year Code | Calendar Week | Week Code |
|---------------|-----------|---------------|-----------|
| 2018 | G | Workweek 01 | 01 |
| 2019 | H | Workweek 02 | 02 |
| 2020 | I | Workweek 03 | 03 |
| 2021 | J | Workweek 04 | 04 |
| 2022 | K | Workweek 05 | 05 |
| 2023 | L | Workweek 06 | 06 |
| 2024 | M | | |

Mechanical Dimensions for TO-252



| COMMON DIMENSIONS | | | |
|-------------------|----------|-------|-------|
| SYMBOL | mm | | |
| | MIN | NOM | MAX |
| A | 2.20 | 2.30 | 2.38 |
| A1 | 0.00 | — | 0.20 |
| A2 | 0.97 | 1.07 | 1.17 |
| b | 0.68 | 0.78 | 0.90 |
| b3 | 5.20 | 5.33 | 5.46 |
| c | 0.43 | 0.53 | 0.61 |
| D | 5.98 | 6.10 | 6.22 |
| D1 | 5.30REF | | |
| E | 6.40 | 6.60 | 6.73 |
| E1 | 4.63 | — | — |
| e | 2.286BSC | | |
| H | 9.40 | 10.10 | 10.50 |
| L | 1.38 | 1.50 | 1.75 |
| L1 | 2.90REF | | |
| L2 | 0.51BSC | | |
| L3 | 0.88 | — | 1.28 |
| L4 | 0.50 | — | 1.00 |
| L5 | 1.65 | 1.80 | 1.95 |
| θ | 0° | — | 8° |

TO-252 Part Marking Information



| Calendar Year | Year Code | Calendar Week | Week Code |
|---------------|-----------|---------------|-----------|
| 2018 | G | Workweek 01 | 01 |
| 2019 | H | Workweek 02 | 02 |
| 2020 | I | Workweek 03 | 03 |
| 2021 | J | Workweek 04 | 04 |
| 2022 | K | Workweek 05 | 05 |
| 2023 | L | Workweek 06 | 06 |
| 2024 | M | | |

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