

PW120N10CS

Perfect MOS5 N-MOSFET 100V, 9.4mΩ, 60A



重庆平伟实业股份有限公司

Features

- Uses PingWei advanced PerfectMOS5 technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent $Q_g \times R_{DS(on)}$ product(FOM)
- Excellent Low Ciss
- Qualified according to JEDEC criteria

Benefits

- High robustness and reliability
- Increases maximum current capability
- Low power loss, high power density
- Easy paralleling

Applications

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

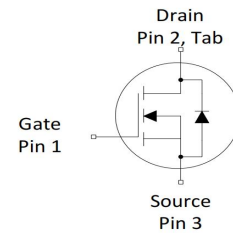
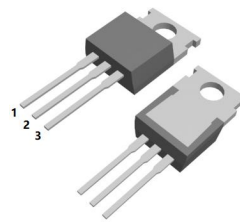


100% DVDS Tested
100% Avalanche Tested

Product Summary

| | |
|----------------------|-------|
| V_{DS} | 100V |
| $R_{DS(on)@10V}$ typ | 9.4mΩ |
| I_D | 60A |

TO-220CB-3L



Package Marking and Ordering Information

| Part # | Marking | Package | Packing | Reel Size | Tape Width | Qty |
|------------|------------|-------------|---------|-----------|------------|-------|
| PW120N10CS | PW120N10CS | TO-220CB-3L | Tube | N/A | N/A | 50pcs |

Absolute Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---|----------------------|--|------------------|
| Drain-source voltage | V_{DS} | 100 | V |
| Continuous drain current | I_D | $T_C = 25^\circ\text{C}$ (Silicon limit) | 60 |
| $T_C = 25^\circ\text{C}$ (Package limit) | | 80 | |
| $T_C = 100^\circ\text{C}$ (Silicon limit) | | 38 | |
| $T_a = 25^\circ\text{C}$ | | 9 | |
| Pulsed drain current ($T_C = 25^\circ\text{C}$, $t_p = 100\mu\text{s}$) | $I_{D\text{ pulse}}$ | 240 | A |
| Avalanche energy, single pulse ($L=0.5\text{mH}$, $V_{ds}=50\text{V}$) | E_{AS} | 36 | mJ |
| Gate-Source voltage | V_{GS} | ± 20 | V |
| Power dissipation | P_{tot} | $T_C = 25^\circ\text{C}$ | 75 |
| $T_a = 25^\circ\text{C}$ | | 1.7 | |
| Operating junction and storage temperature | T_j, T_{stg} | -55...+150 | $^\circ\text{C}$ |
| Soldering temperature, wave soldering only allowed at leads (1.6mm from case for 10s) | T_{sold} | 260 | $^\circ\text{C}$ |

Thermal Resistance

| Parameter | Symbol | Value | | | Unit | Test Condition |
|--|--------|-------|------|------|------|----------------|
| | | min. | typ. | max. | | |
| Thermal resistance, junction – case. | RthJC | - | 1.31 | 1.7 | °C/W | - |
| Thermal resistance, junction - ambient(min. footprint) | RthJA | - | - | 73 | °C/W | - |

Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

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

Static Characteristic

| | | | | | | |
|----------------------------------|--------------|-----|----------|-----------|---------|---|
| Drain-source breakdown voltage | BV_{DSS} | 100 | - | - | V | $V_{GS}=0V, I_D=250\mu A$ |
| Gate threshold voltage | $V_{GS(th)}$ | 2 | - | 4 | V | $V_{DS}=V_{GS}, I_D=250\mu A$ |
| Zero gate voltage drain current | I_{DSS} | - | 0.02 | 1 | μA | $V_{DS}=100V, V_{GS}=0V$ $T_j=25^\circ C$ $T_j=150^\circ C$ |
| Gate-source leakage current | I_{GSS} | - | ± 10 | ± 100 | nA | $V_{GS}=\pm 20V, V_{DS}=0V$ |
| Drain-source on-state resistance | $R_{DS(on)}$ | - | 9.4 | 12.0 | mΩ | $V_{GS}=10V, I_D=20A$ |
| Transconductance | g_{fs} | - | 26 | - | S | $V_{DS}=5V, I_D=20A$ |

Dynamic Characteristic

| | | | | | | |
|------------------------------|--------------|---|------|---|----|--|
| Input Capacitance | C_{iss} | - | 1251 | - | pF | $V_{GS}=0V, V_{DS}=50V,$ $f=1MHz$ |
| Output Capacitance | C_{oss} | - | 434 | - | | |
| Reverse Transfer Capacitance | C_{rss} | - | 30 | - | | |
| Gate Total Charge | Q_G | - | 24 | - | nC | $V_{DS}=80V, I_D=20A,$ $V_{GS}=10V$ |
| Gate-Source charge | Q_{gs} | - | 7 | - | | |
| Gate-Drain charge | Q_{gd} | - | 9 | - | | |
| Turn-on delay time | $t_{d(on)}$ | - | 12 | - | ns | $V_{GS}=10V, V_{DD}=50V,$ $R_{G_ext}=5\Omega, I_D=20A$ |
| Rise time | t_r | - | 38 | - | | |
| Turn-off delay time | $t_{d(off)}$ | - | 20 | - | | |
| Fall time | t_f | - | 6 | - | | |
| Gate resistance | R_G | - | 1.3 | - | 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} | - | 0.88 | 1.2 | V | $V_{GS}=0V, I_{SD}=20A$ |
| Body Diode Continuous Forward Current | I_S | - | - | 60 | A | $TC = 25^{\circ}C$ |
| Body Diode Pulsed Current | I_S pulse | - | - | 240 | A | $TC = 25^{\circ}C$ |
| Body Diode Reverse Recovery Time | t_{rr} | - | 56 | - | ns | $V_R=45V, I_F=5A,$ $dI/dt=100A/\mu s$ |
| Body Diode Reverse Recovery Charge | Q_{rr} | - | 139 | - | nC | |



Typical Performance Characteristics

Fig 1: Output Characteristics

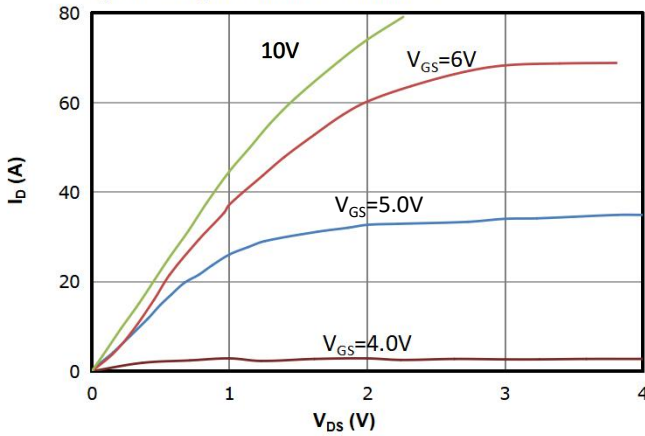


Fig 2: Transfer Characteristics

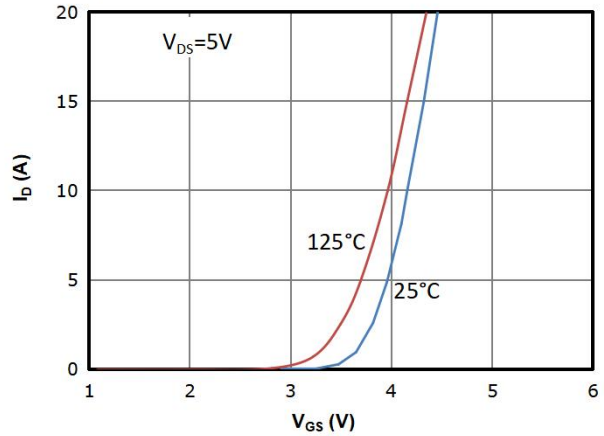


Fig 3: $R_{DS(on)}$ vs Drain Current and Gate Voltage

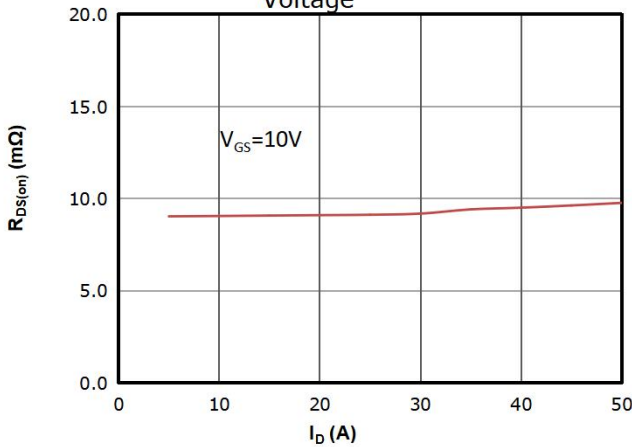


Fig 4: $R_{DS(on)}$ vs Gate Voltage

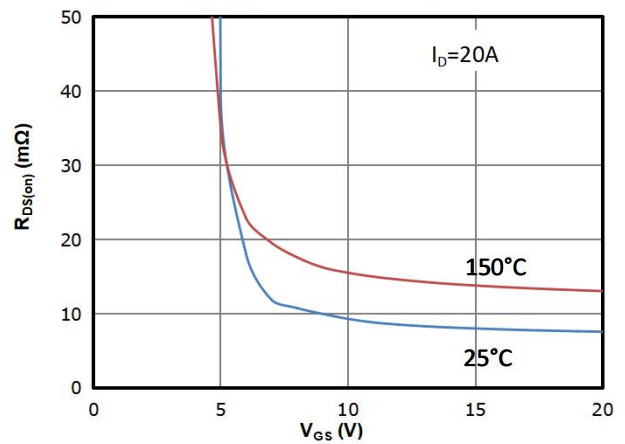


Fig 5: $R_{DS(on)}$ vs. Temperature

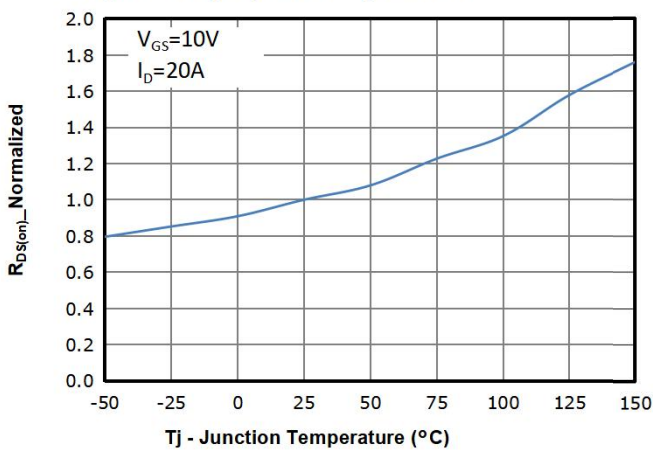


Fig 6: $V_{GS(th)}$ vs. Temperature

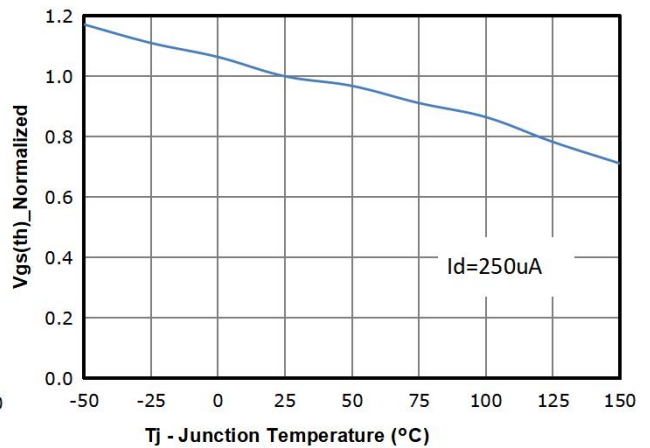




Fig 7: BVdss vs. Temperature

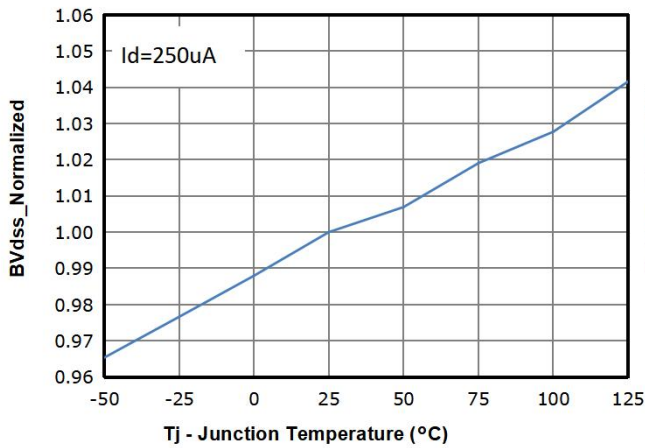


Fig 8: Capacitance Characteristics

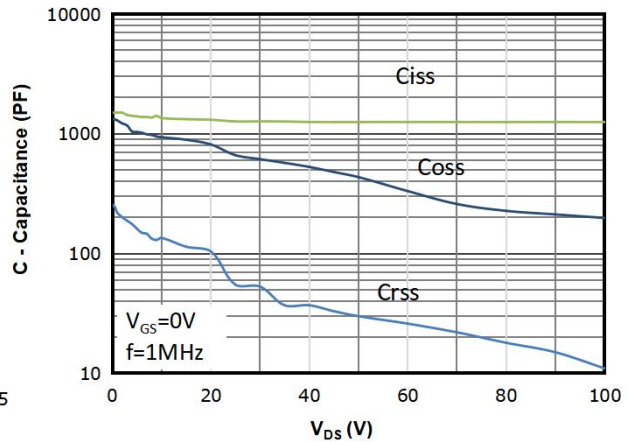


Fig 9: Gate Charge Characteristics

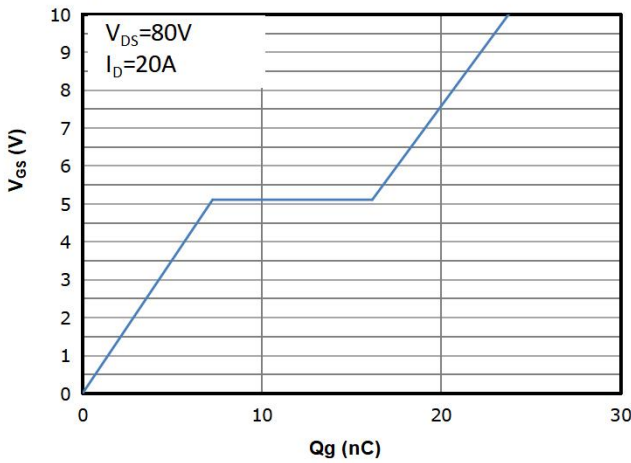


Fig 10: Body-diode Forward Characteristics

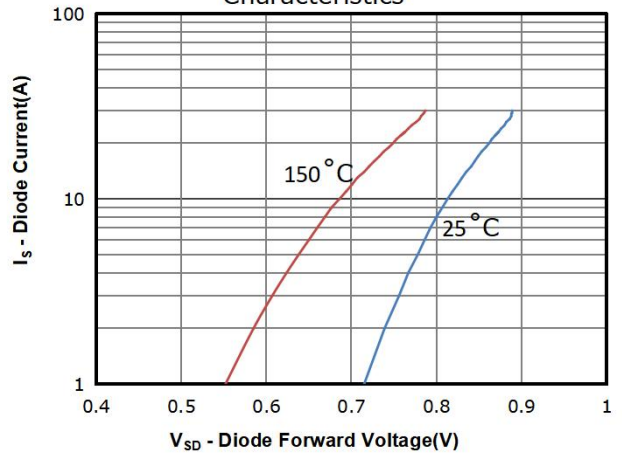


Fig 11: Power Dissipation

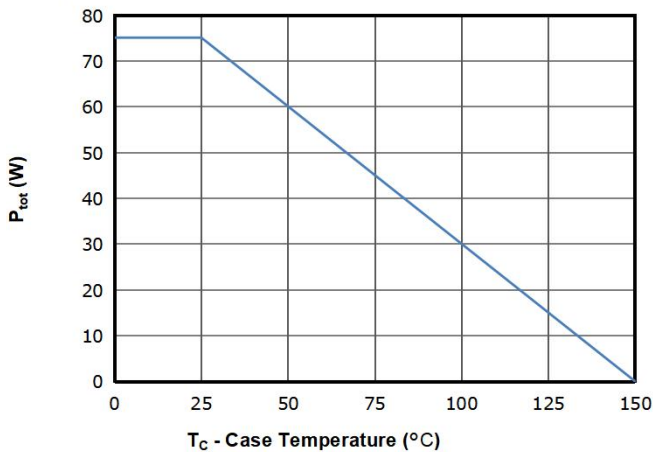


Fig 12: Drain Current Derating

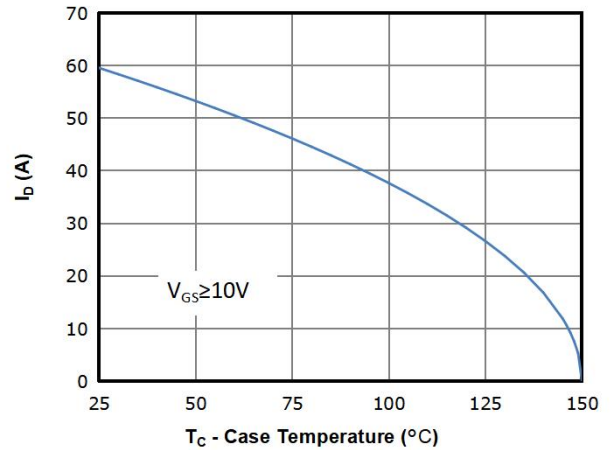




Fig 13: Safe Operating Area

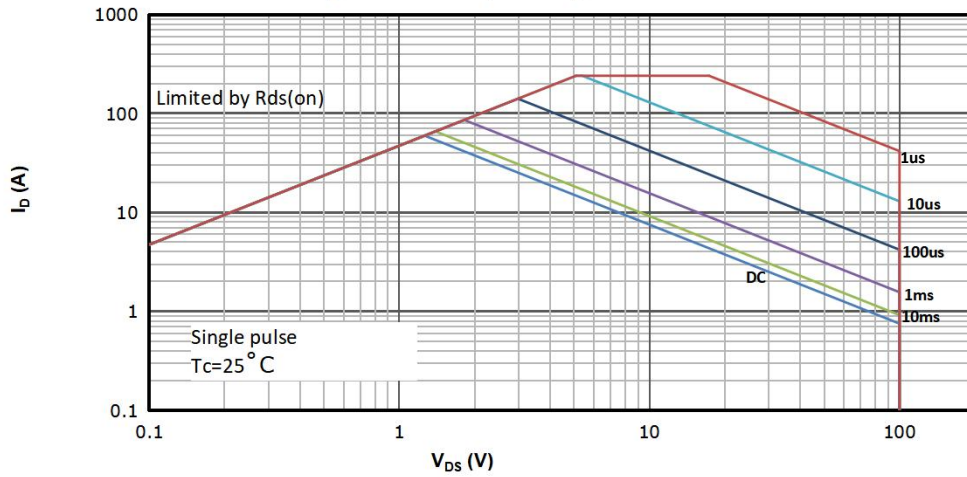
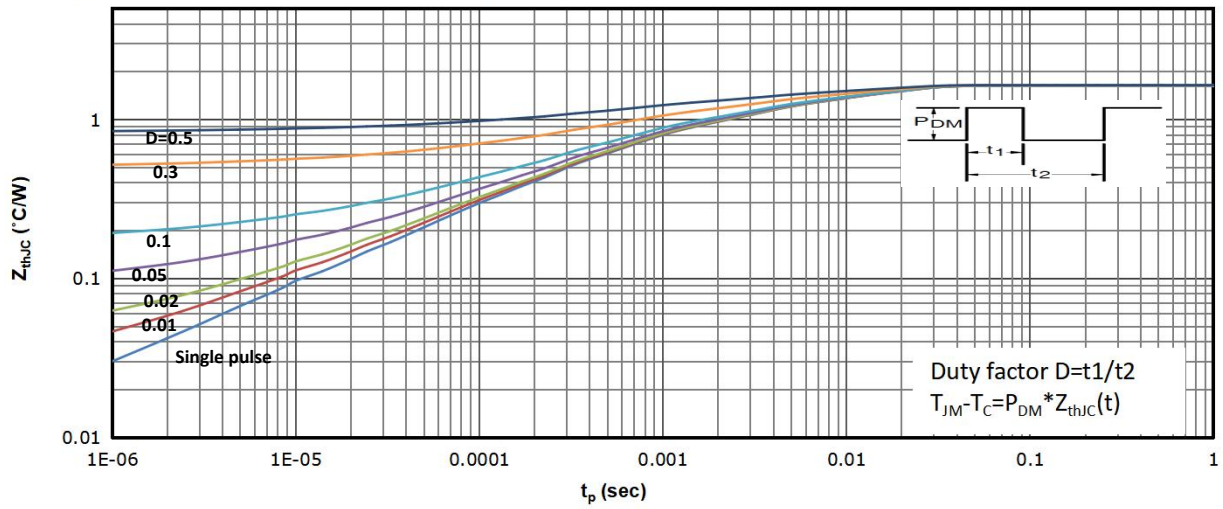
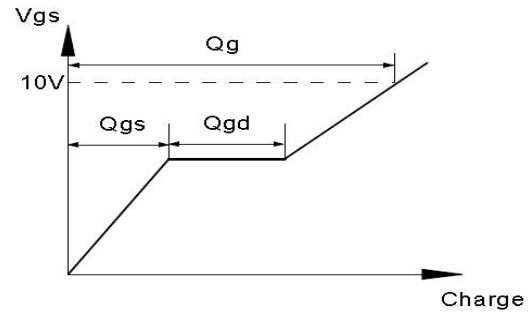
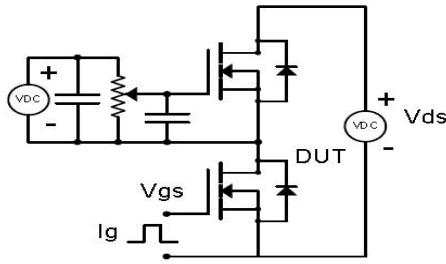


Fig 14: Max. Transient Thermal Impedance

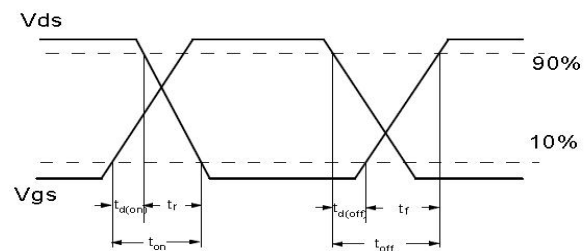
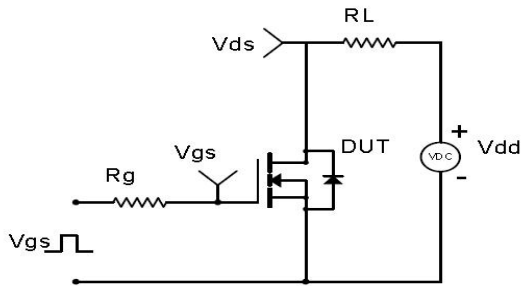


Test Circuit & Waveform

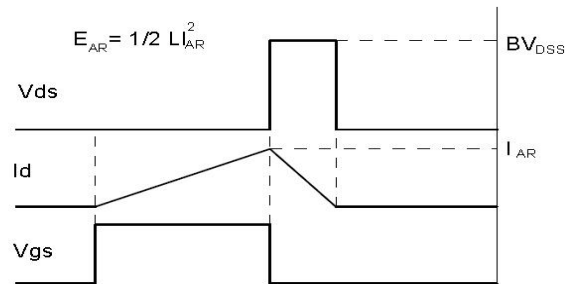
Gate Charge Test Circuit & Waveform



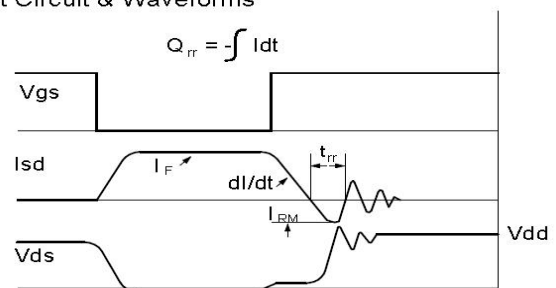
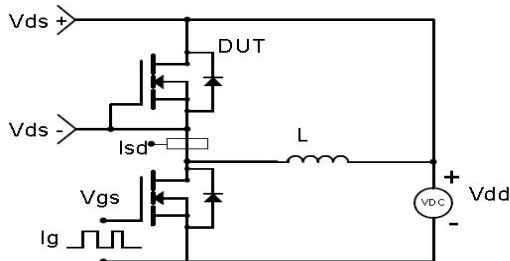
Resistive Switching Test Circuit & Waveforms



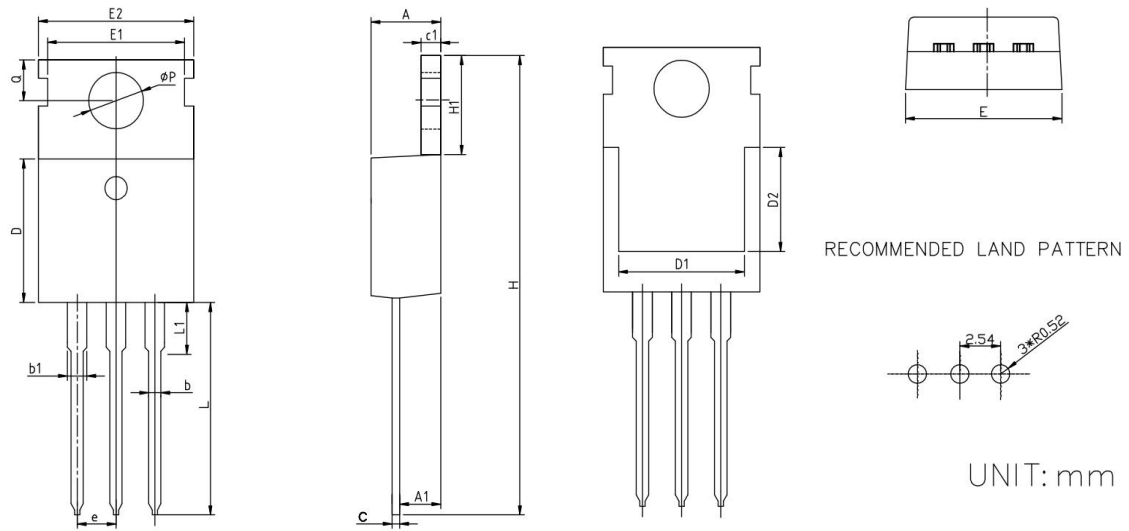
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outline: TO-220CB-3L



| SYMBOL | MILLIMETERS | | INCHES | |
|--------|-------------|-------|--------|-------|
| | MIN | MAX | MIN | MAX |
| A | 4.40 | 4.80 | 0.173 | 0.189 |
| A1 | 2.25 | 2.55 | 0.089 | 0.100 |
| b | 0.72 | 0.92 | 0.028 | 0.036 |
| b1 | 1.12 | 1.42 | 0.044 | 0.056 |
| c | 0.40 | 0.60 | 0.016 | 0.024 |
| c1 | 1.20 | 1.40 | 0.047 | 0.055 |
| D | 8.80 | 9.40 | 0.346 | 0.370 |
| D1 | 7.75 | 8.15 | 0.305 | 0.321 |
| D2 | 6.55 | 6.95 | 0.258 | 0.274 |
| e | 2.54 | | 0.100 | |
| E | 9.65 | 10.35 | 0.380 | 0.407 |
| E1 | 8.70 | | 0.343 | |
| E2 | 9.70 | 10.30 | 0.382 | 0.406 |
| H | 28.70 | 29.70 | 1.130 | 1.169 |
| H1 | 6.25 | 6.85 | 0.246 | 0.270 |
| L | 13.20 | 13.80 | 0.520 | 0.543 |
| L1 | 2.80 | 3.40 | 0.110 | 0.134 |
| Q | 2.60 | 3.00 | 0.102 | 0.118 |
| φP | 3.45 | 3.75 | 0.136 | 0.148 |



Revision History

| Revision | Date | Major changes |
|----------|-----------|---|
| 1.0 | 2023/3/29 | Release of Formal Version. |
| 1.1 | 2023/5/16 | Update the Tdon/Tr/Tdoff/Tf parameter and Test Condition. |

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