

| | | | |
|--|---------------------|---------------------|------------------|
| Features <ul style="list-style-type: none"> ➤ Super Low Gate Charge ➤ Green Device Available ➤ Excellent Cdv/dt effect decline ➤ Advanced high cell density Trench technology ➤ 100% EAS Guaranteed | <i>Bvdss</i> | <i>Rdson</i> | <i>ID</i> |
| | 30V | 3.2mΩ | 90A |
| Application <ul style="list-style-type: none"> ➤ PWM applications ➤ Load Switch ➤ Power management | | | |

Package

Marking and pin assignment

TO-252top view

Schematic diagram

Package Marking and Ordering Information

| Device Marking | Device | Device Package | Quantity |
|----------------|--------|----------------|----------|
| 90N03 | 90N03 | TO-252 | 2500 |

Absolute Maximum Ratings (T_C=25°C unless otherwise specified)

| Parameter | Symbol | Value | | Unit |
|---|-----------------------------------|-----------------------|--------------|------|
| | | 10s | Steady State | |
| Drain-Source Voltage | V _{DSS} | 30 | | V |
| Gate-Source Voltage | V _{GSS} | ±20 | | V |
| Continuous Drain Current V _{GS} @ 10V(1) | I _D | T _C = 25°C | 90 | A |
| | | T _C = 75°C | 45 | A |
| Pulsed Drain Current(2) | I _{DM} | 290 | | A |
| Avalanche Current | I _{AS} | 36 | | A |
| 'Single Pulsed Avalanche Energy(3) | EAS | 196 | | mJ |
| Power Dissipation(4) | P _D | T _C = 25°C | 46 | W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +175 | | °C |

Thermal Resistance Ratings

| Parameter | Symbol | Value | Unit |
|---|------------------|-------|------|
| Thermal Resistance Junction-Case (1) | R _{θJC} | 2.1 | °C/W |
| Thermal Resistance Junction-Ambient (1) | R _{θJA} | 62 | °C/W |



Ordering Information

| Ordering Number | Package | Pin Assignment | | | Packing |
|-----------------|---------|----------------|---|---|-----------|
| Halogen Free | | G | D | S | |
| HL90N03 | TO-252 | 1 | 2 | 3 | Tape Reel |

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

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---------------------------------------|--------------------------------|--|------|------|-----------|------------------------|
| Drain-Source Breakdown Voltage | $B_{V_{DS}}$ | $V_{GS}=0V, I_D=250\mu A$ | 30 | --- | --- | V |
| BVDSS Temperature Coefficient | $\Delta B_{V_{DS}}/\Delta T_J$ | Reference to 25°C , $I_D=1\text{mA}$ | --- | --- | --- | V/ $^{\circ}\text{C}$ |
| Static Drain-Source On-Resistance (2) | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=30A$ | --- | 3.2 | 4.5 | $m\Omega$ |
| | | $V_{GS}=4.5V, I_D=15A$ | --- | 4.8 | 8.5 | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{GS}=V_{DS}, I_D=250\mu A$ | 1.2 | 1.6 | 2.5 | V |
| VGS(th) Temperature Coefficient | $\Delta V_{GS(th)}$ | | --- | --- | --- | mV/ $^{\circ}\text{C}$ |
| Drain-Source Leakage Current | I_{DSS} | $V_{DS}=30V, V_{GS}=0V, T_J=25^{\circ}\text{C}$ | --- | --- | 1 | μA |
| | | $V_{DS}=30V, V_{GS}=0V, T_J=100^{\circ}\text{C}$ | --- | --- | 100 | |
| Gate-Source Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | --- | --- | ± 100 | nA |
| Forward Transconductance | g_{fs} | $V_{DS}=10V, I_D=30A$ | --- | 80 | --- | S |
| Gate Resistance | R_g | $V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$ | --- | 2 | --- | Ω |
| Total Gate Charge | Q_g | $V_{GS}=4.5V, V_{DS}=15V, I_D=30A$ | --- | 20 | --- | nC |
| Gate-Source Charge | Q_{gs} | | --- | 5 | --- | |
| Gate-Drain Charge | Q_{gd} | | --- | 7.2 | --- | |
| Turn-On Delay Time | $T_{d(on)}$ | $V_{GS}=10V, V_{DD}=15V, I_D=30A, R_{GEN}=3\Omega$ | --- | 9 | --- | ns |
| Rise Time | T_r | | --- | 16 | --- | |
| Turn-Off Delay Time | $T_{d(off)}$ | | --- | 43 | --- | |
| Fall Time | T_f | | --- | 12 | --- | |
| Input Capacitance | C_{iss} | $V_{DS}=15V, V_{GS}=0V, f=1\text{MHz}$ | --- | 2088 | --- | pF |
| Output Capacitance | C_{oss} | | --- | 277 | --- | |
| Reverse Transfer Capacitance | C_{rss} | | --- | 209 | --- | |

| Parameter | Symbol | Test Condition | Min. | Typ. | Max. | Units |
|--|----------|---|------|------|------|-------|
| Maximum Continuous Drain to Source Diode Forward Current (1) (5) | I_S | $V_G=V_D=0V$, Force Current | - | - | 90 | A |
| Drain to Source Diode Forward Voltage (2) | V_{SD} | $V_{GS}=0V, I_S=1A, T_J=25^{\circ}\text{C}$ | - | - | 1.2 | V |

Notes:

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width \cong 300us , duty cycle \cong 2%
- 3.The EAS data shows Max. rating . The test condition is $T_J = 25^\circ C, V_{DD}=24V, V_{GS}=10V, L=0.1mH, I_{AS}=36A$.
- 4.The power dissipation is limited by $150^\circ C$ junction temperature
- 5.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Electrical and Thermal Characteristics (Curves)

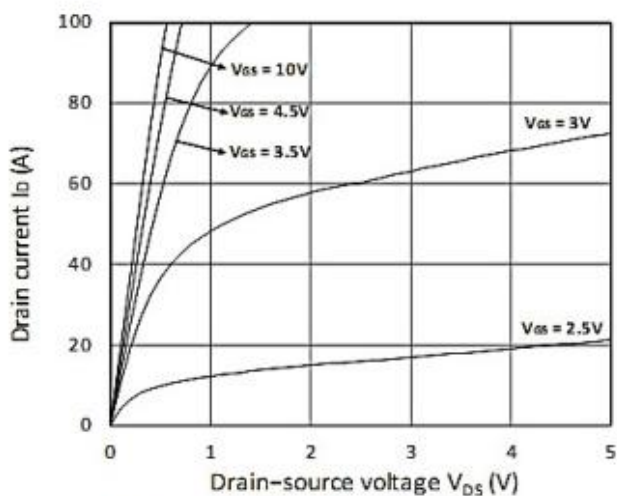


Figure 1. Output Characteristics

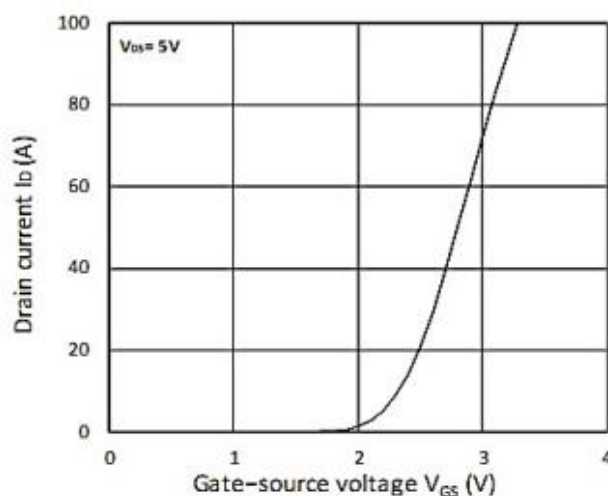


Figure 2. Transfer Characteristics

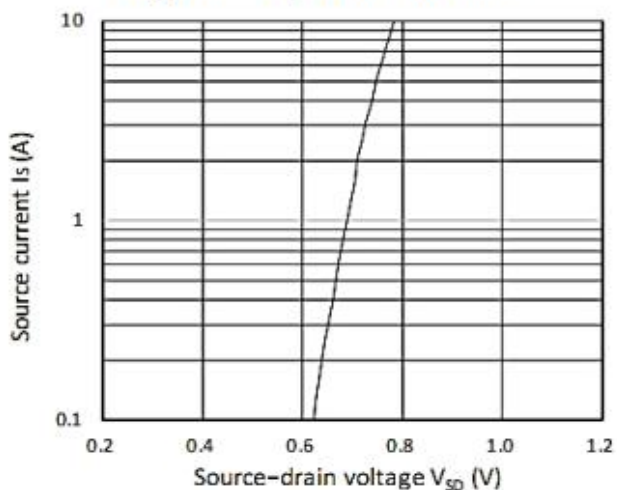


Figure 3. Forward Characteristics of Reverse

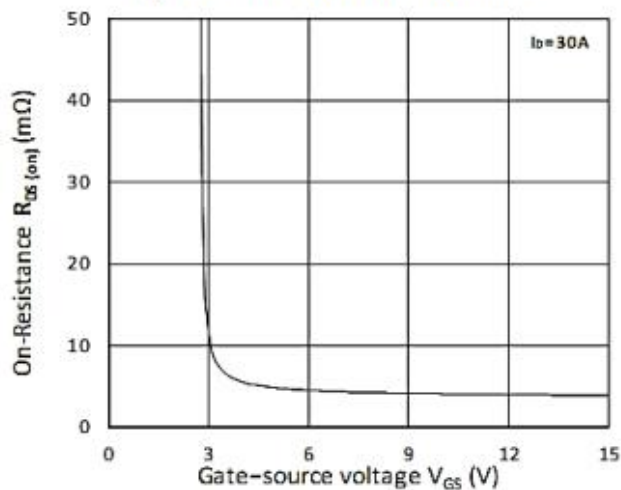


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

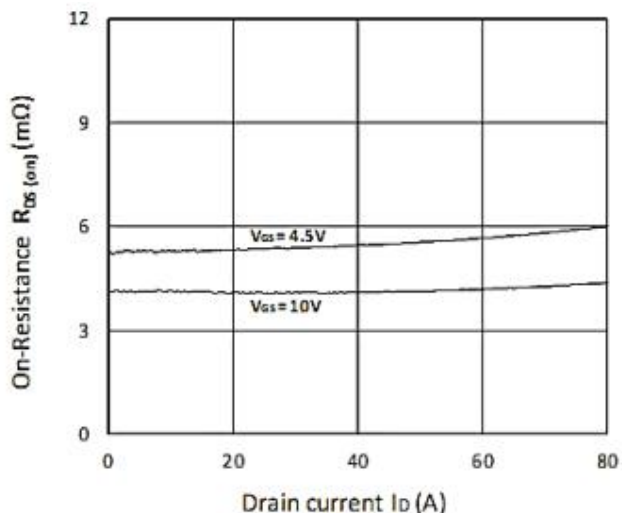


Figure 5. $R_{DS(ON)}$ vs. I_D

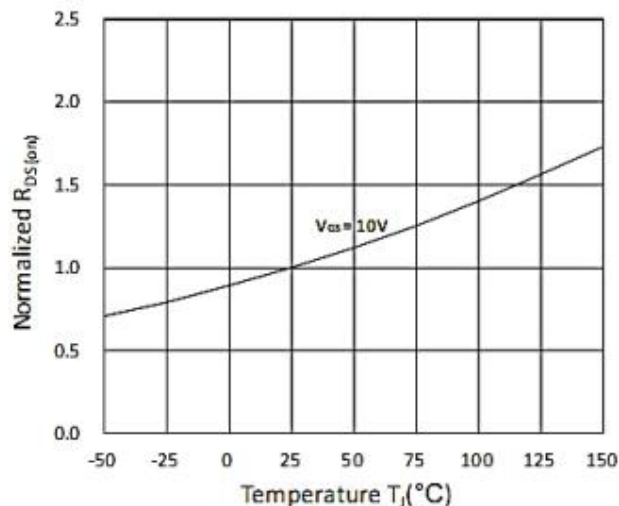


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

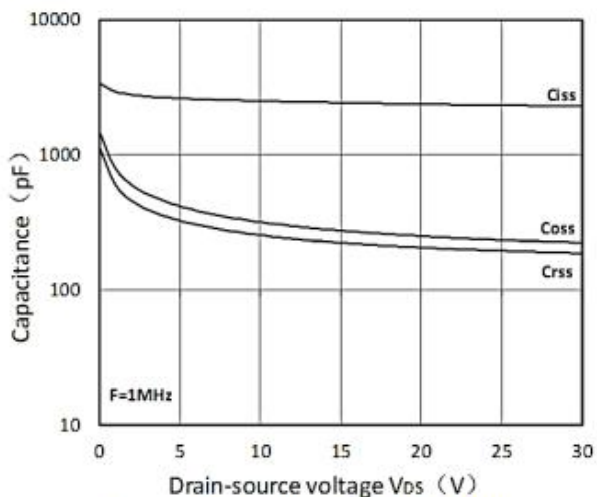


Figure 7. Capacitance Characteristics

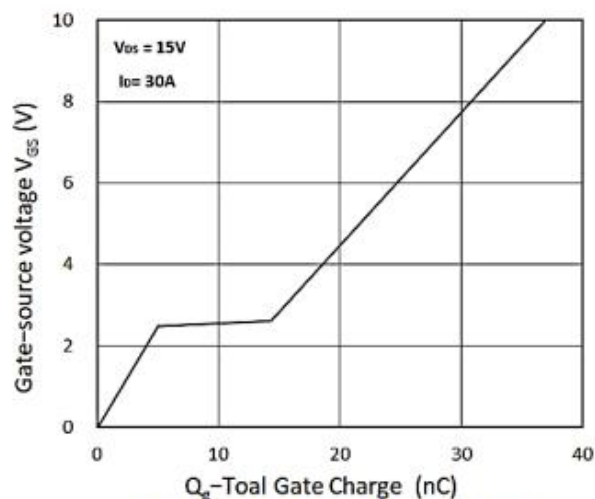


Figure 8. Gate Charge Characteristics

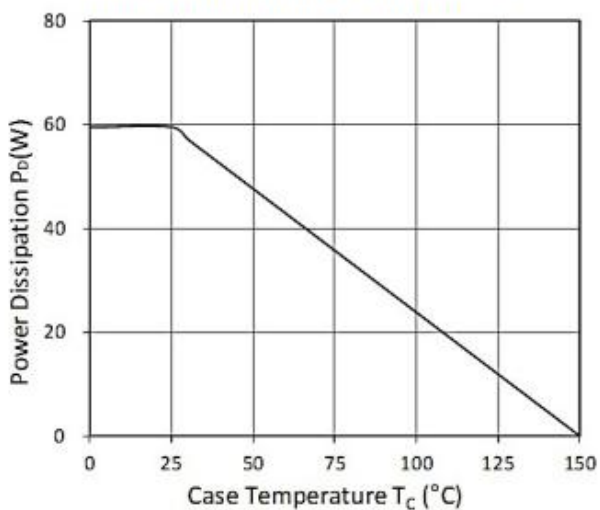


Figure 9. Power Dissipation

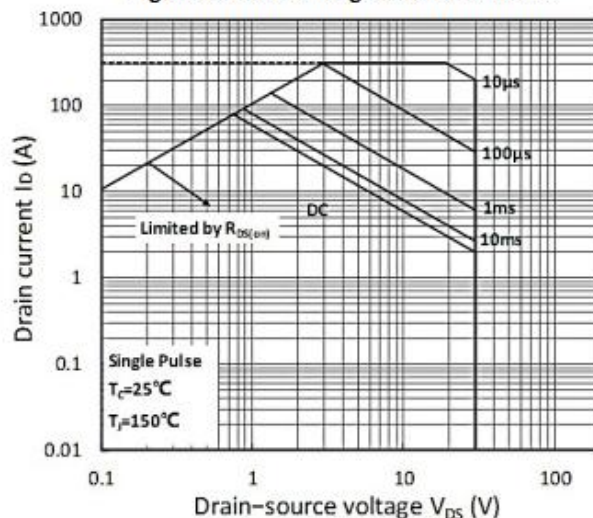


Figure 10. Safe Operating Area

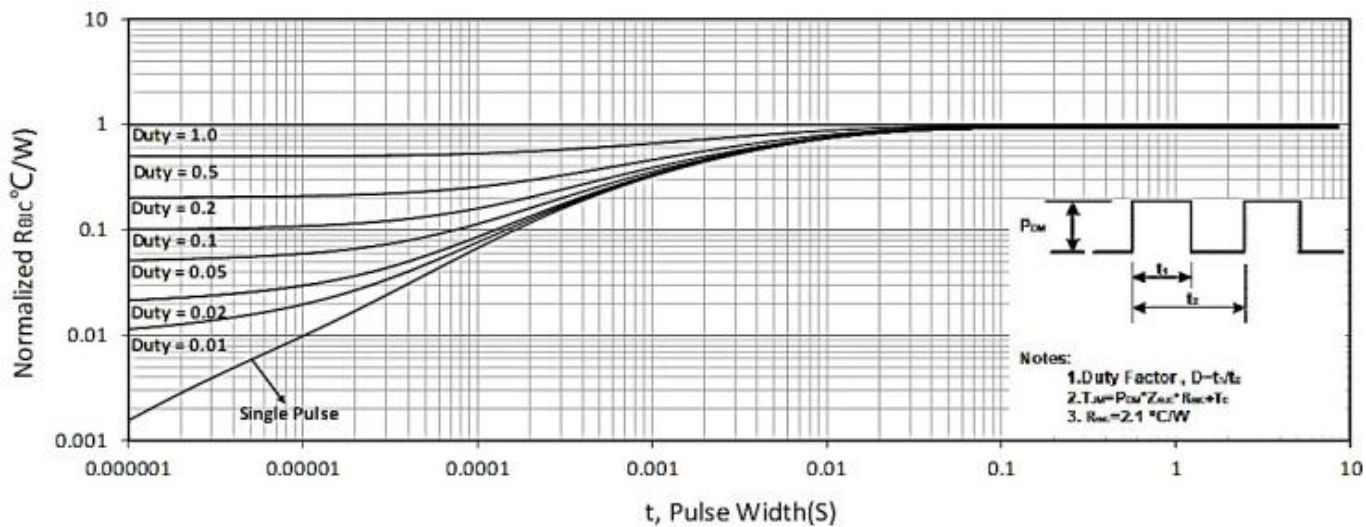
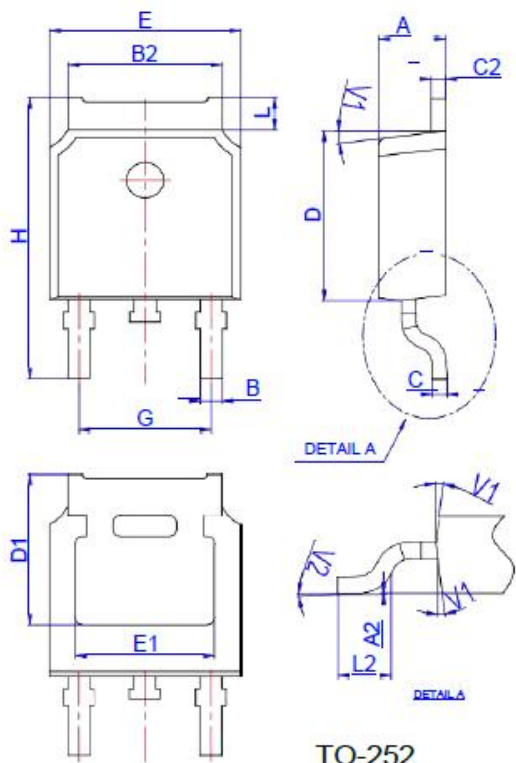


Figure 11. Normalized Maximum Transient Thermal Impedance

Package Dimensions

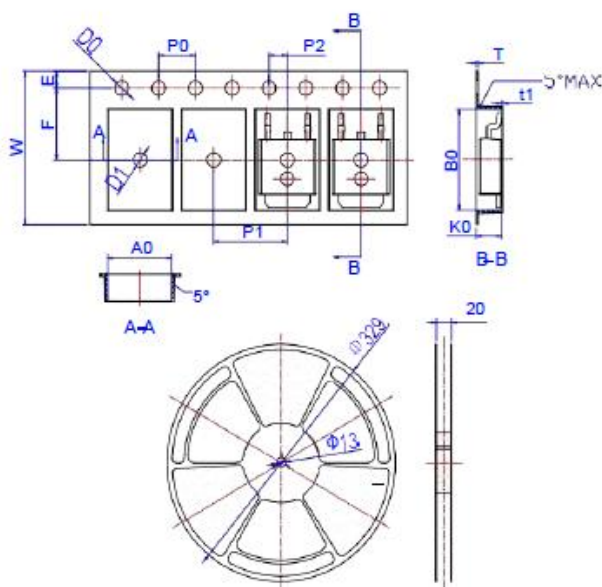
➤ TO-252

Package Mechanical Data TO 252



| Ref. | Dimensions | | | | | |
|------|-------------|------|-------|----------|------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 2.10 | | 2.50 | 0.083 | | 0.098 |
| A2 | 0 | | 0.10 | 0 | | 0.004 |
| B | 0.66 | | 0.86 | 0.026 | | 0.034 |
| B2 | 5.18 | | 5.48 | 0.202 | | 0.216 |
| C | 0.40 | | 0.60 | 0.016 | | 0.024 |
| C2 | 0.44 | | 0.58 | 0.017 | | 0.023 |
| D | 5.90 | | 6.30 | 0.232 | | 0.248 |
| D1 | 5.30REF | | | 0.209REF | | |
| E | 6.40 | | 6.80 | 0.252 | | 0.268 |
| E1 | 4.63 | | | 0.182 | | |
| G | 4.47 | | 4.67 | 0.176 | | 0.184 |
| H | 9.50 | | 10.70 | 0.374 | | 0.421 |
| L | 1.09 | | 1.21 | 0.043 | | 0.048 |
| L2 | 1.35 | | 1.65 | 0.053 | | 0.065 |
| V1 | | 7° | | | 7° | |
| V2 | | 0° | 6° | 0° | | 6° |

Reel Specification-TO-252



| Ref. | Dimensions | | | | | |
|------|-------------|-------|-------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| W | 15.90 | 16.00 | 16.10 | 0.626 | 0.630 | 0.634 |
| E | 1.65 | 1.75 | 1.85 | 0.065 | 0.069 | 0.073 |
| F | 7.40 | 7.50 | 7.60 | 0.291 | 0.295 | 0.299 |
| D0 | 1.40 | 1.50 | 1.60 | 0.055 | 0.059 | 0.063 |
| D1 | 1.40 | 1.50 | 1.60 | 0.055 | 0.059 | 0.063 |
| P0 | 3.90 | 4.00 | 4.10 | 0.154 | 0.157 | 0.161 |
| P1 | 7.90 | 8.00 | 8.10 | 0.311 | 0.315 | 0.319 |
| P2 | 1.90 | 2.00 | 2.10 | 0.075 | 0.079 | 0.083 |
| A0 | 6.85 | 6.90 | 7.00 | 0.270 | 0.271 | 0.276 |
| B0 | 10.45 | 10.50 | 10.60 | 0.411 | 0.413 | 0.417 |
| K0 | 2.68 | 2.78 | 2.88 | 0.105 | 0.109 | 0.113 |
| T | 0.24 | | 0.27 | 0.009 | | 0.011 |
| t1 | 0.10 | | | 0.004 | | |
| 10P0 | 39.80 | 40.00 | 40.20 | 1.567 | 1.575 | 1.583 |



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