

- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology
- ★ 100% EAS Guaranteed

Product Summary

RoHS

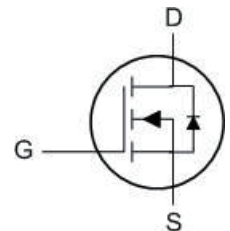
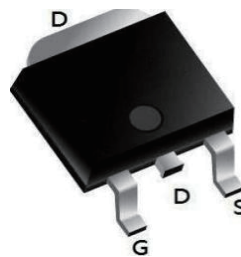
| BVDSS | RDS(on) | ID |
|-------|---------|-----|
| 20V | 7.5mΩ | 40A |

Description

The 40N02 is the high cell density trenched N-ch MOSFETs, which provide excellent $R_{DS(on)}$ and gate charge for most of the synchronous buck converter applications.

The 40N02 meet the RoHS and Green Product, requirement 100% EAS guaranteed with full function reliability approved.

TO252 Pin Configuration



Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|-----------------------|--|------------|------------|
| V_{DS} | Drain-Source Voltage | 20 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| $I_D@T_C=25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 40 | A |
| $I_D@T_C=100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 20 | A |
| I_{DM} | Pulsed Drain Current ² | 120 | A |
| E_{AS} | Single Pulse Avalanche Energy ³ | 23 | mJ |
| I_{AS} | Avalanche Current | 21 | A |
| $P_D@T_C=25^\circ C$ | Total Power Dissipation ⁴ | 25 | W |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ C$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | $^\circ C$ |

Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|-----------------|---|------|------|--------------|
| $R_{\theta JC}$ | Thermal Resistance Junction-Case ¹ | --- | 7.5 | $^\circ C/W$ |

Electrical Characteristics (T_J =25 °C unless otherwise specified)

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Units |
|--|--|--|------|------|------|-------|
| Off Characteristics | | | | | | |
| V _{(BR)DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D = 250 μ A | 20 | - | - | V |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} = -20V, V _{GS} =0V, | - | - | 1 | μ A |
| I _{GSS} | Gate to Body Leakage Current | V _{DS} =0V, V _{GS} = ±12V | - | - | ±100 | nA |
| On Characteristics | | | | | | |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} =V _{GS} , I _D = -250 μ A | 0.5 | 0.75 | 1.2 | V |
| R _{DS(on)} | Static Drain-Source on-Resistance Note3 | V _{GS} = 4.5V, I _D = 15A | - | 8 | 11.2 | m Ω |
| | | V _{GS} = 2.5V, I _D = -10A | - | 11.7 | 17.5 | |
| Dynamic Characteristics | | | | | | |
| C _{iss} | Input Capacitance | V _{DS} = -10V, V _{GS} =0V, f=1.0MHz | - | 1000 | - | pF |
| C _{oss} | Output Capacitance | | - | 182 | - | |
| C _{rss} | Reverse Transfer Capacitance | | - | 164 | - | |
| Q _g | Total Gate Charge | V _{DS} =10V, I _D = 15A, V _{GS} = 4.5V | - | 15 | - | nC |
| Q _{gs} | Gate-Source Charge | | - | 2 | - | |
| Q _{gd} | Gate-Drain(“Miller”) Charge | | - | 5.2 | - | |
| Switching Characteristics | | | | | | |
| T _{d(on)} | Turn-on Delay Time | V _{DD} = 10V, I _D = 15A, V _{GS} =4.5V, R _{GEN} =3 Ω | - | 9 | - | ns |
| T _r | Turn-on Rise Time | | - | 25 | - | |
| T _{d(off)} | Turn-off Delay Time | | - | 37 | - | |
| T _f | Turn-off Fall Time | | - | 14 | - | |
| Drain-Source Diode Characteristics and Maximum Ratings | | | | | | |
| I _S | Maximum Continuous Drain to Source Diode Forward Current | | - | - | 40 | A |
| I _{SM} | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | 120 | V |
| V _{SD} | Drain to Source Diode Forward | V _{GS} =0V, I _S = 30A | - | 25 | 1.2 | ns |

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: T_J=25°C, V_{DD}=10V, V_G=4.5V, R_G=25Ω, L=0.5mH, I_{AS}=9.6A
3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

Typical Performance Characteristics

Figure1: Output Characteristics

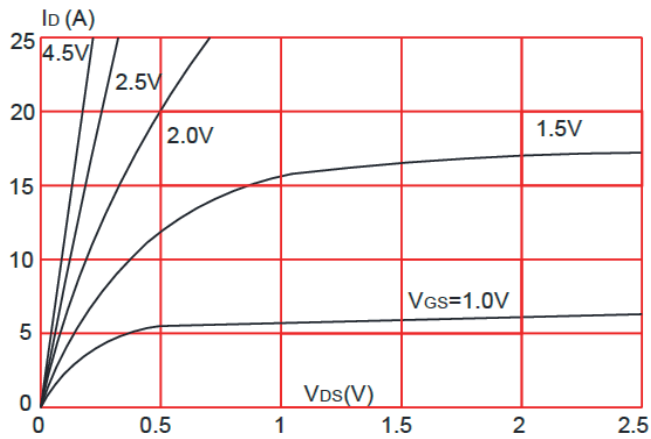


Figure 2: Typical Transfer Characteristics

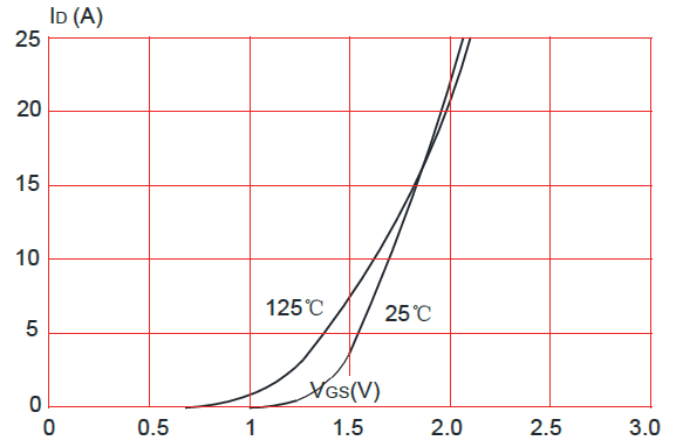


Figure 3: On-resistance vs. Drain Current

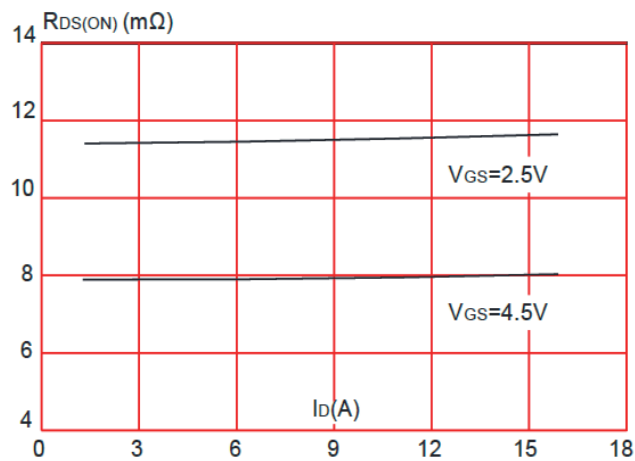


Figure 4: Body Diode Characteristics

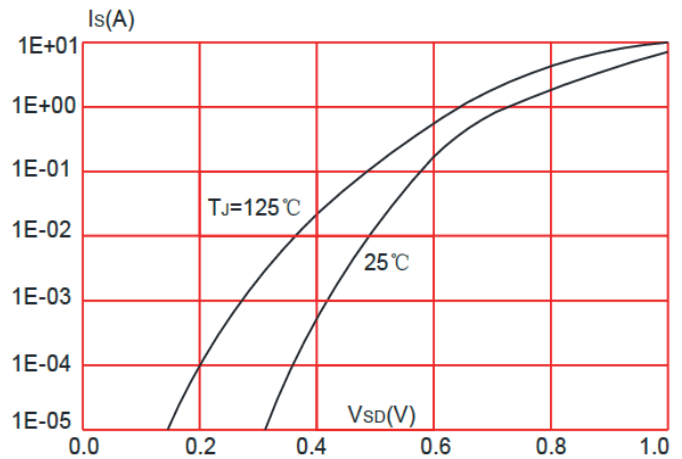


Figure 5: Gate Charge Characteristics

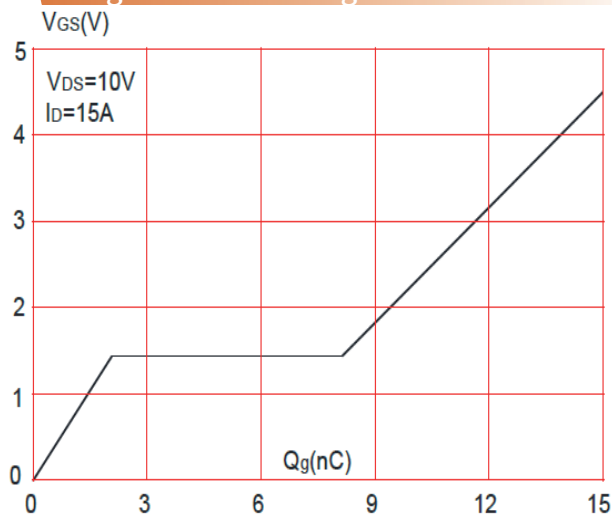
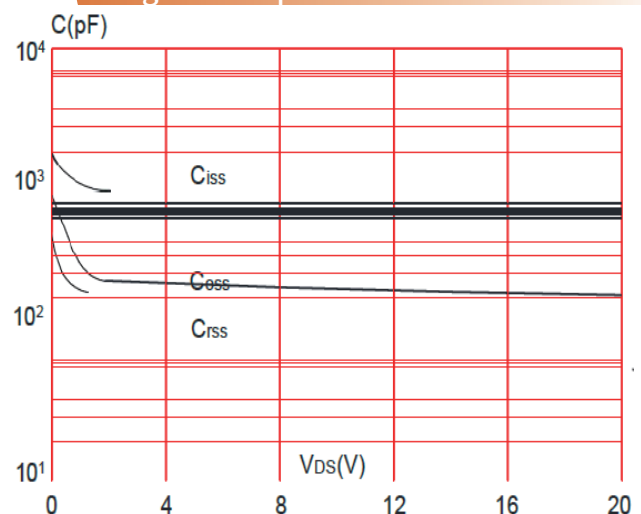


Figure 6: Capacitance Characteristics



Typical Performance Characteristics

Figure 7: Normalized Breakdown Voltage

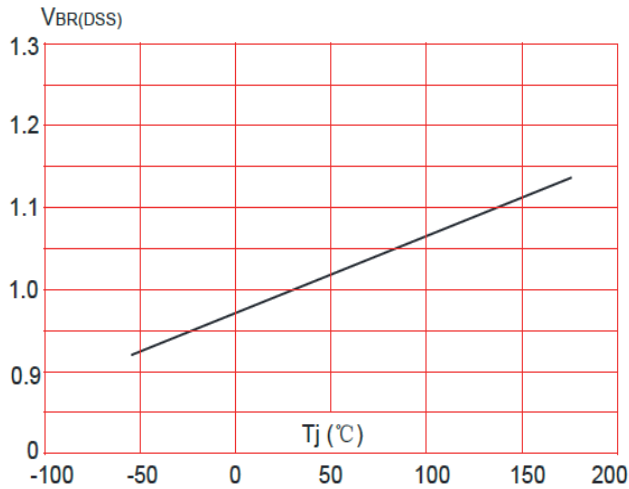


Figure 8: Normalized on Resistance vs. Junction Temperature

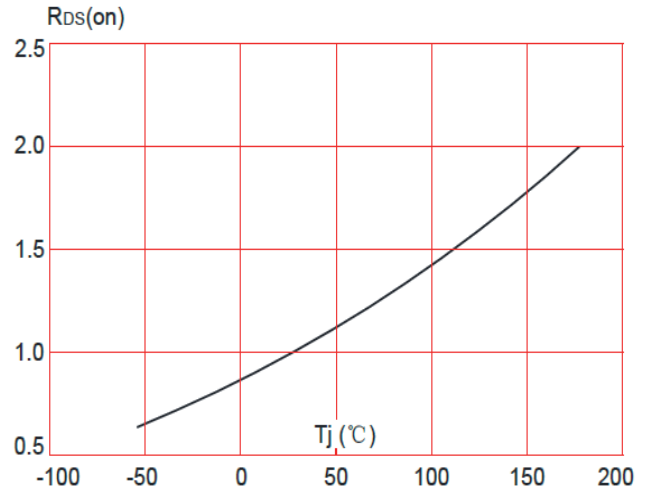


Figure 9: Maximum Safe Operating Area

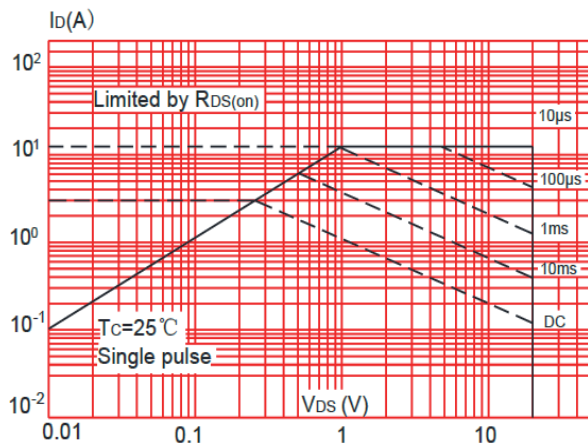


Figure 10: Maximum Continuous Drain Current vs. Temperature

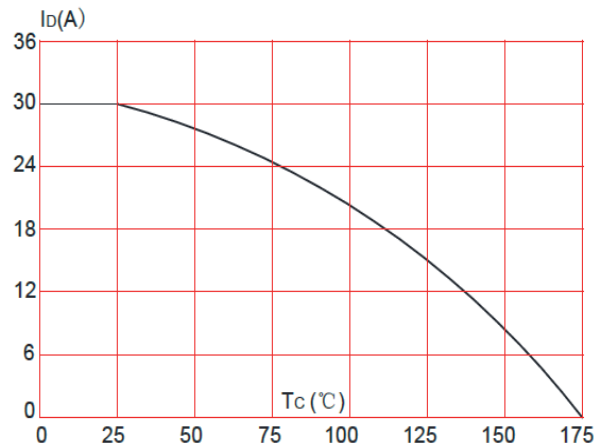
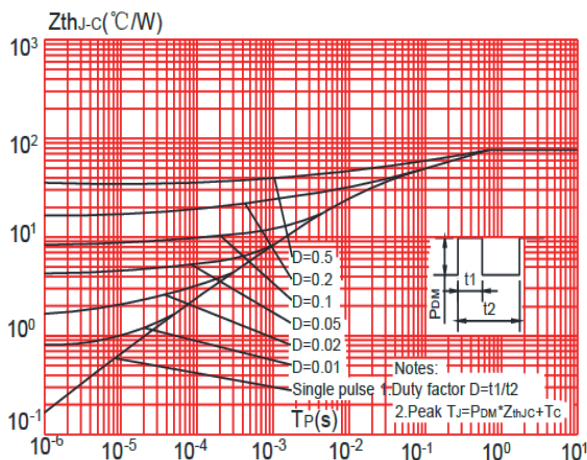
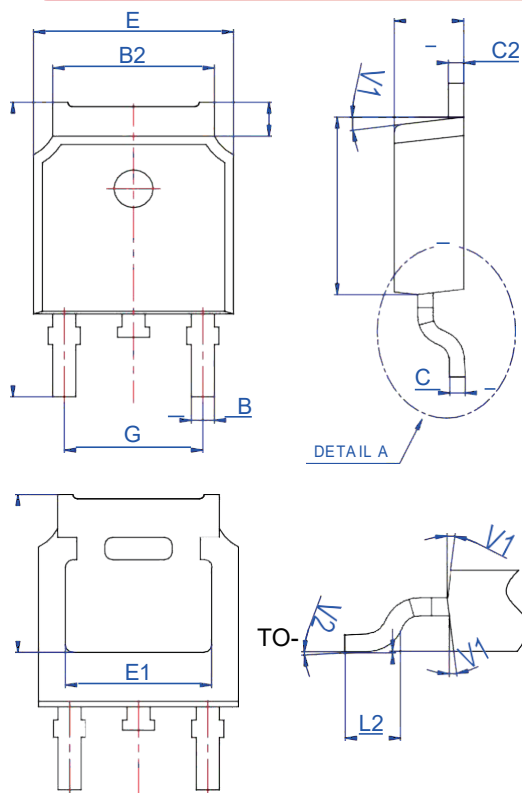


Figure.11: Maximum Effective Transient Thermal Impedance

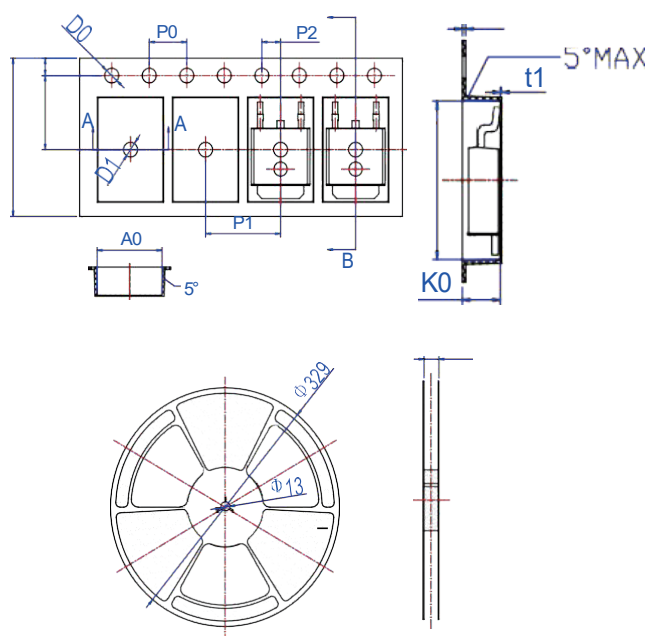


Package Mechanical Data-TO-252-4R



| Ref. | Dimensions | | | | | |
|------|-------------|------|------|----------|------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 2.1 | | 2.5 | 0.083 | | 0.098 |
| A2 | 0 | | 0.1 | 0 | | 0.004 |
| B | 0.66 | | 0.86 | 0.026 | | 0.034 |
| B2 | 5.18 | | 5.48 | 0.202 | | 0.216 |
| C | 0.4 | | 0.6 | 0.016 | | 0.024 |
| C2 | 0.44 | | 0.58 | 0.017 | | 0.023 |
| D | 5.9 | | 6.3 | 0.232 | | 0.248 |
| D1 | 5.30REF | | | 0.209REF | | |
| E | 6.4 | | 6.8 | 0.252 | | 0.268 |
| E1 | 4.63 | | | 0.182 | | |
| G | 4.47 | | 4.67 | 0.176 | | 0.184 |
| H | 9.5 | | 10.7 | 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-252-4R



| Ref. | Dimensions | | | | | |
|------|-------------|------|------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| W | 15.9 | 16 | 16.1 | 0.626 | 0.63 | 0.634 |
| E | 1.65 | 1.75 | 1.85 | 0.065 | 0.069 | 0.073 |
| F | 7.4 | 7.5 | 7.6 | 0.291 | 0.295 | 0.299 |
| D0 | 1.4 | 1.5 | 1.6 | 0.055 | 0.059 | 0.063 |
| D1 | 1.4 | 1.5 | 1.6 | 0.055 | 0.059 | 0.063 |
| P0 | 3.9 | 4 | 4.1 | 0.154 | 0.157 | 0.161 |
| P1 | 7.9 | 8 | 8.1 | 0.311 | 0.315 | 0.319 |
| P2 | 1.9 | 2 | 2.1 | 0.075 | 0.079 | 0.083 |
| A0 | 6.85 | 6.9 | 7 | 0.27 | 0.271 | 0.276 |
| B0 | 10.45 | 10.5 | 10.6 | 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 | 0.1 | | | 0.004 | | |
| 10P0 | 39.8 | 40 | 40.2 | 1.567 | 1.575 | 1.583 |

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