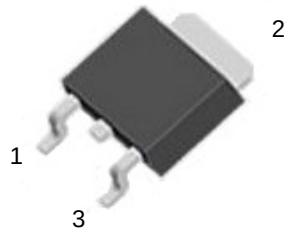
# CTKD60N02

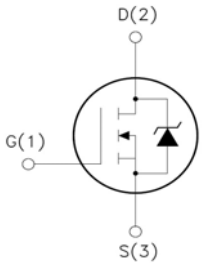
**N-Ch 20V Fast Switching MOSFETs**

### Product Summary

| BVDSS | RDSON | ID |
|---|---|---|
| 20V | 6.3 mΩ | 60A |

TO-252




1.Gate (G)
2.Drain (D)
3.Source (S)

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

### Description

The CTK60N02 is the high cell density trenched N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The CTK60N02 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

### 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℃ | Continuous Drain Current, $V_{GS}$ @ 10V[1] | 60 | A |
| $I_D$@$T_C$=100℃ | Continuous Drain Current, $V_{GS}$ @ 10V[1] | 33 | A |
| $I_{DM}$ | Pulsed Drain Current[2] | 210 | A |
| EAS | Single Pulse Avalanche Energy[3] | 36 | mJ |
| $I_{AS}$ | Avalanche Current | 31 | A |
| $P_D$@$T_C$=25℃ | Total Power Dissipation[4] | 35 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |

### Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance Junction-Case[1] | --- | 4.8 | ℃/W |

## Electrical Characteristics ($T_J$=25℃ unless otherwise specified)

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| **Off Characteristic** | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=250μA | 20 | - | - | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=20V, $V_{GS}$=0V, | - | - | 1.0 | μA |
| $I_{GSS}$ | Gate to Body Leakage Current | $V_{DS}$=0V, $V_{GS}$=±12V | - | - | ±100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=250μA | 0.4 | 0.7 | 1.1 | V |
| $R_{DS(on)}$ | Static Drain-Source on-Resistance note3 | $V_{GS}$=4.5V, $I_D$=25A | - | 6.3 | 8.0 | mΩ |
| | | $V_{GS}$=2.5V, $I_D$=10A | - | 8.8 | 13 | |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=10V, $V_{GS}$=0V, f=1.0MHz | - | 1458 | - | pF |
| $C_{oss}$ | Output Capacitance | | - | 238 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 212 | - | pF |
| $Q_g$ | Total Gate Charge | $V_{DS}$=10V, $I_D$=25A, $V_{GS}$=4.5V | - | 19 | - | nC |
| $Q_{gs}$ | Gate-Source Charge | | - | 3 | - | nC |
| $Q_{gd}$ | Gate-Drain(“Miller”) Charge | | - | 6.4 | - | nC |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DS}$=10V, $I_D$=10A, $R_{GEN}$=3Ω, $V_{GS}$=4.5V | - | 10 | - | ns |
| $t_r$ | Turn-on Rise Time | | - | 21 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | | - | 39 | - | ns |
| $t_f$ | Turn-off Fall Time | | - | 19 | - | ns |
| **Drain-Source Diode Characteristics and Maximum Ratings** | | | | | | |
| $I_S$ | Maximum Continuous Drain to Source Diode Forward Current | | - | - | 50 | A |
| $I_{SM}$ | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | 200 | A |
| $V_{SD}$ | Drain to Source Diode Forward Voltage | $V_{GS}$=0V, $I_S$=30A | - | - | 1.2 | V |
| trr | Body Diode Reverse Recovery Time | IF=20A,dI/dt=100A/μs | - | 25 | - | ns |
| Qrr | Body Diode Reverse Recovery Charge | | - | 20 | - | nC |

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition: $T_J$=25℃, $V_{DD}$=10V, $V_G$=4.5V, L=0.5mH, $R_G$=25Ω, $I_{AS}$=12A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

## Typical Performance Characteristics

**Figure1:** Output Characteristics

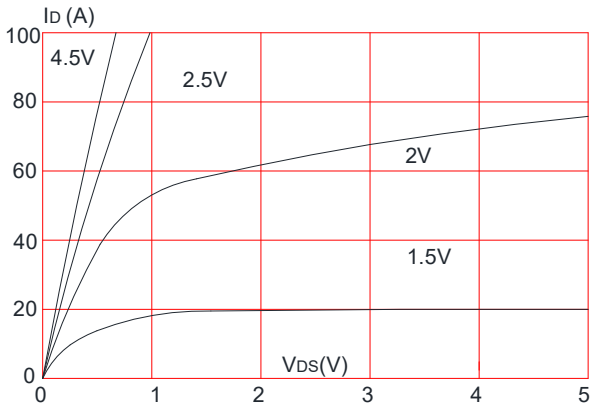



**Figure 2:** Typical Transfer Characteristics

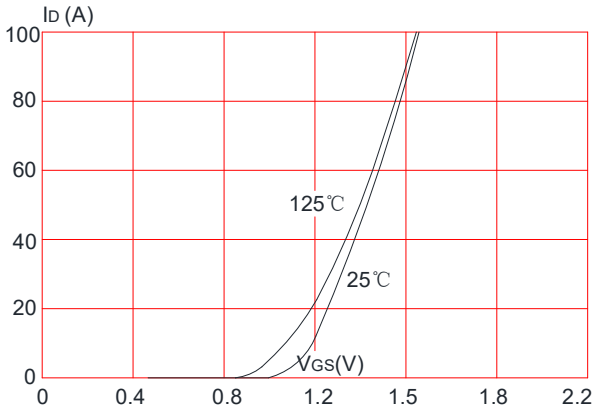



**Figure 3:**On-resistance vs. Drain Current

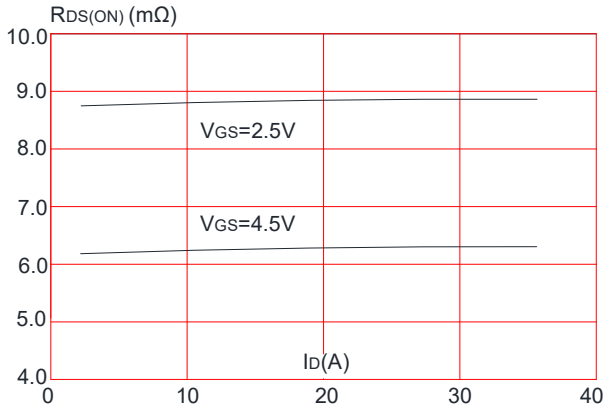



**Figure 4**: Body Diode Characteristics

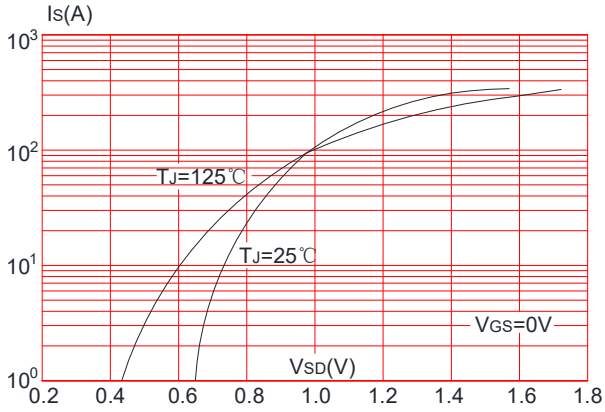



**Figure 5:** Gate Charge Characteristics

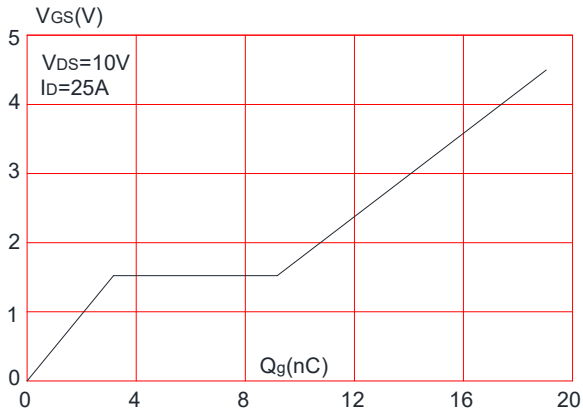



**Figure 6:** Capacitance Characteristics

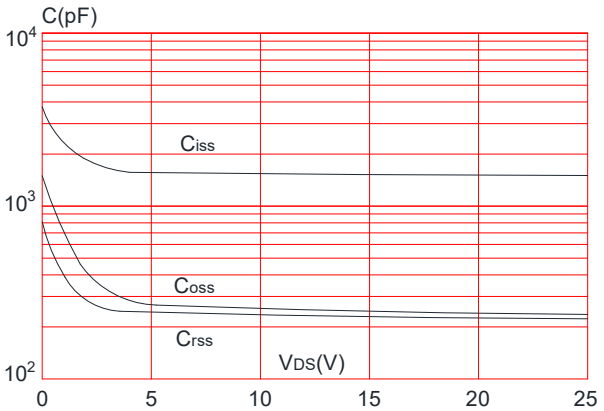


**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature

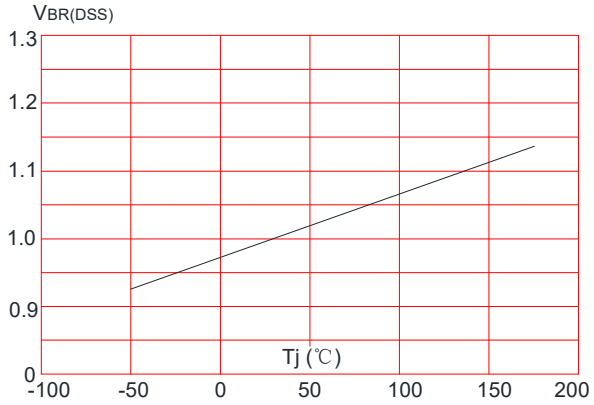



**Figure 8:** Normalized on Resistance vs. Junction Temperature

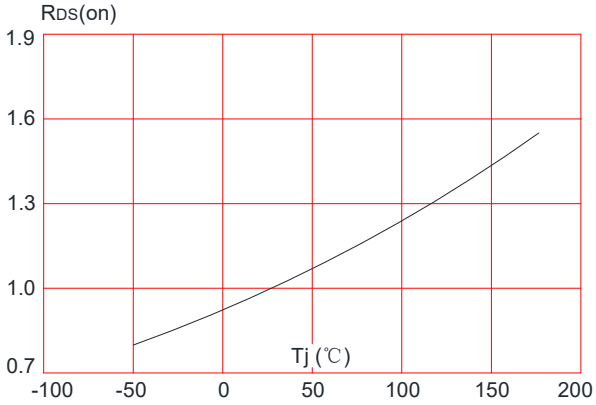



**Figure 9:** Maximum Safe Operating Area

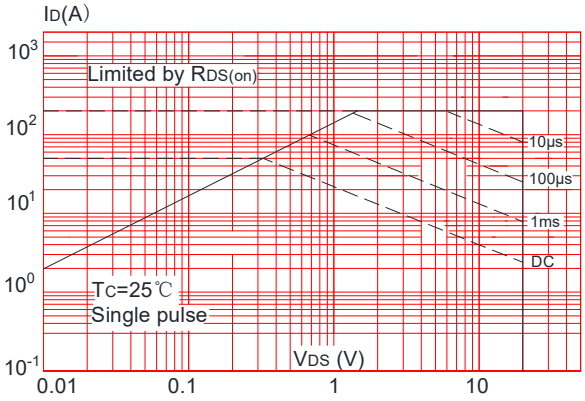



**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature

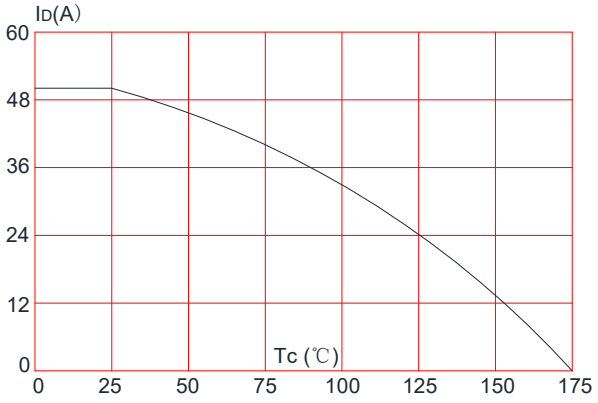
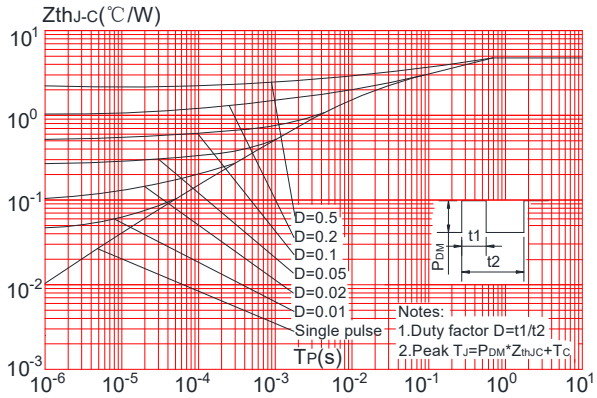
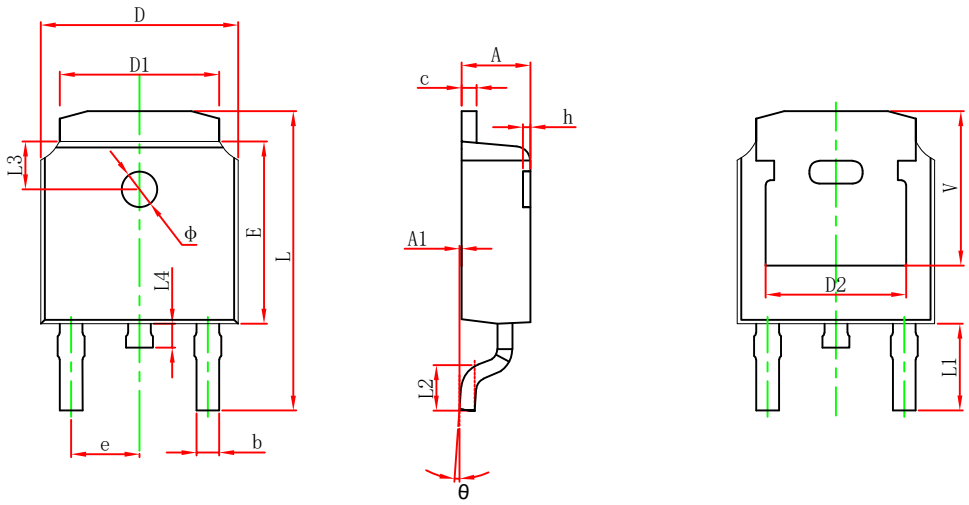



**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case

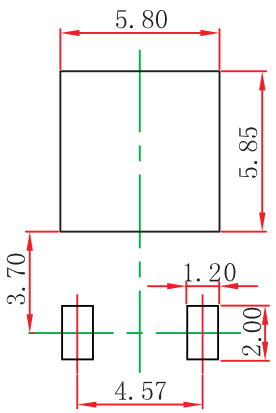


## Package Dimension




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 2.200 | 2.400 | 0.087 | 0.094 |
| A1 | 0.000 | 0.127 | 0.000 | 0.005 |
| b | 0.700 | 0.860 | 0.025 | 0.030 |
| c | 0.460 | 0.580 | 0.018 | 0.023 |
| D | 6.500 | 6.700 | 0.256 | 0.264 |
| D1 | 5.100 | 5.460 | 0.201 | 0.215 |
| D2 | 4.830 REF. | | 0.190 REF. | |
| E | 6.000 | 6.300 | 0.236 | 0.244 |
| e | 2.186 | 2.386 | 0.086 | 0.094 |
| L | 9.712 | 10.312 | 0.382 | 0.406 |
| L1 | 2.900 REF. | | 0.114 REF. | |
| L2 | 1.400 | 1.700 | 0.055 | 0.067 |
| L3 | 1.600 REF. | | 0.063 REF. | |
| L4 | 0.600 | 1.000 | 0.024 | 0.039 |
| Φ | 1.100 | 1.300 | 0.043 | 0.051 |
| θ | 0° | 8° | 0° | 8° |
| h | 0.000 | 0.300 | 0.000 | 0.012 |
| V | 5.250 REF. | | 0.207 REF. | |

### TO-252-2L Suggest Pad Layout




**NOTE:**

1. Controlling dimension: in millimeters.
2. General tolerance: ±0.05mm.
3. The pad layout is for reference purposes only.