## Description

This is CT56N02DZT uses advanced power trench technology that has been especially tailored to minimize the on-state resistance.

This device is suitable for un-directional or bidirectional load switch, facilitated by its common- drain configuration.

## Applications

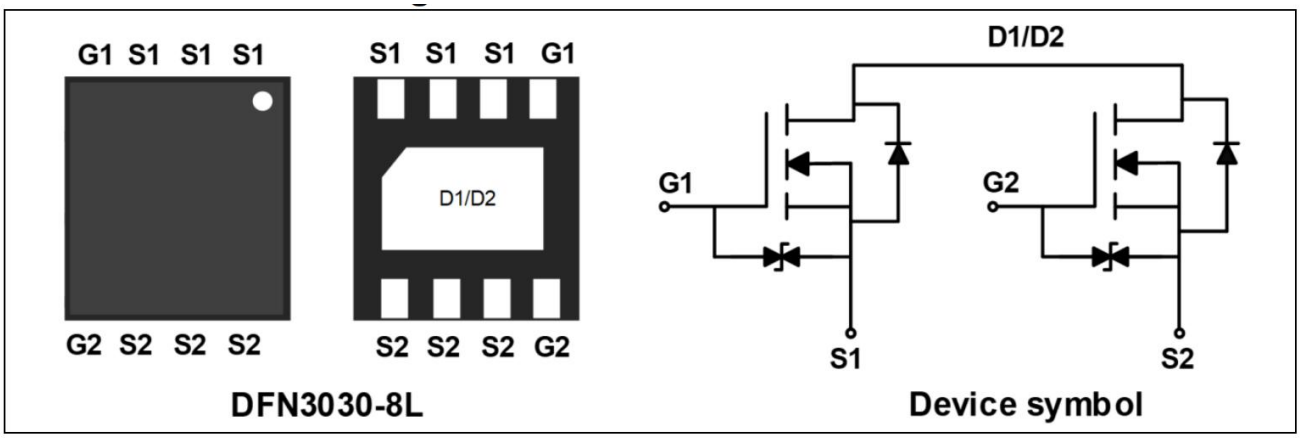
- Battery protection
- Load switch

## Features

- Super high dense cell for low $R_{DS(on)}$
- RoHS Compliant and Halogen-Free
- ESD protected: Class 2

| $V_{(BR)DSS}$(V) | $I_D$(A) | $R_{DS(on)}$TYP (mΩ) |
|---|---|---|
| 20 | 56 | 4.0 @VGS=4.5V |
| | | 4.2 @VGS=3.9V |
| | | 4.6 @VGS=3.1V |
| | | 5.2 @VGS=2.5V |

## Schematic&PIN Configuration



## Absolute Maximum Ratings(Ta=25℃)

| Parameter | | Symbol | Value | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 20 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±12 | V |
| Continuous Drain Current | $T_C$=25°C | $I_D$ | 56 | A |
| | $T_C$=100°C | | 35.6 | |
| | $T_A$=25°C | | 20 | |
| | $T_A$=70°C | | 15.8 | |
| Pulsed Drain Current[1] | | $I_{DM}$ | 100 | A |
| Single Pulse Avalanche Energy[2] | | EAS | 61.2 | mJ |
| Total Power Dissipation | $T_C$=25°C | $P_D$ | 31 | W |
| | $T_A$=25°C | | 3.6 | |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to 150 | °C |

## Thermal Characteristics

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Thermal Resistance from Junction-to-Ambient[3] | $R_{\theta JA}$ | 35 | °C/W |
| Thermal Resistance from Junction-to-Case | $R_{\theta JC}$ | 4 | °C/W |

## Electrical Characteristics (TJ = 25°C, unless otherwise noted)

| Parameter | | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | | |
| Drain-Source Breakdown Voltage | | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ = 250μA | 20 | - | - | V |
| Zero Gate Voltage Drain Current | $T_J$=25°C | $I_{DSS}$ | $V_{DS}$ = 20V, $V_{GS}$ = 0V | - | - | 1 | μA |
| | $T_J$=100°C | | | - | - | 100 | |
| Gate-body Leakage Current | | $I_{GSS}$ | $V_{DS}$ = 0V, $V_{GS}$ = ±8V | - | - | ±10 | μA |
| Gate-Threshold Voltage | | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | 0.45 | - | 1.0 | V |
| Drain-Source on-Resistance[4] | | $R_{DS(on)}$ | $V_{GS}$ = 4.5V, $I_D$ = 3A | 3.2 | 4.0 | 5.2 | mΩ |
| | | | $V_{GS}$ = 3.9V, $I_D$ = 3A | 3.4 | 4.2 | 5.8 | |
| | | | $V_{GS}$ = 3.1V, $I_D$ = 3A | 3.6 | 4.6 | 6 | |
| | | | $V_{GS}$ = 2.5V, $I_D$ = 3A | 4 | 5.2 | 6.4 | |
| **Dynamic Characteristics**[5] | | | | | | | |
| Input Capacitance | | $C_{iss}$ | $V_{DS}$ = 10V, $V_{GS}$ =0V, f =1MHz | - | 2170 | - | pF |
| Output Capacitance | | $C_{oss}$ | | - | 331 | - | |
| Reverse Transfer Capacitance | | $C_{rss}$ | | - | 309 | - | |
| **Switching Characteristics**[5] | | | | | | | |
| Total Gate Charge | | $Q_g$ | $V_{GS}$ = 4.5V, $V_{DS}$ = 10V, $I_D$= 3A | - | 27.8 | - | nC |
| Gate-Source Charge | | $Q_{gs}$ | | - | 4.1 | - | |
| Gate-Drain Charge | | $Q_{gd}$ | | - | 7.9 | - | |
| Turn-on Delay Time | | $t_{d(on)}$ | $V_{GS}$ =4.5V, $V_{DD}$ = 10V, $R_G$ = 3Ω, $I_D$= 3A | - | 6.8 | - | ns |
| Rise Time | | $t_r$ | | - | 11.2 | - | |
| Turn-off Delay Time | | $t_{d(off)}$ | | - | 93 | - | |
| Fall Time | | $t_f$ | | - | 40 | - | |
| **Drain-Source Diode Characteristics** | | | | | | | |
| Diode Forward Voltage[4] | | $V_{SD}$ | $I_S$ = 3A, $V_{GS}$ = 0V | - | - | 1.2 | V |
| Continuous Source Current | $T_C$=25°C | $I_S$ | - | - | - | 56 | A |

**Notes:**

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C.
2. The test condition is $V_{DD}$=25V, $V_{GS}$=10V, L=0.1mH, $I_{AS}$=35A.
3. The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
5. This value is guaranteed by design hence it is not included in the production test.

## Typical Characteristics

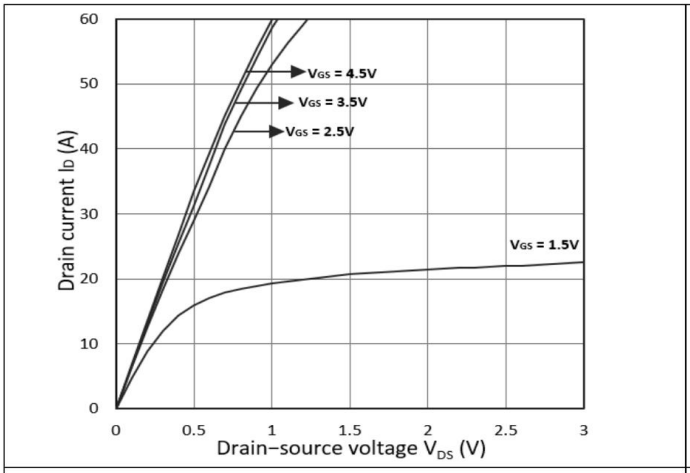



Figure 1. Output Characteristics

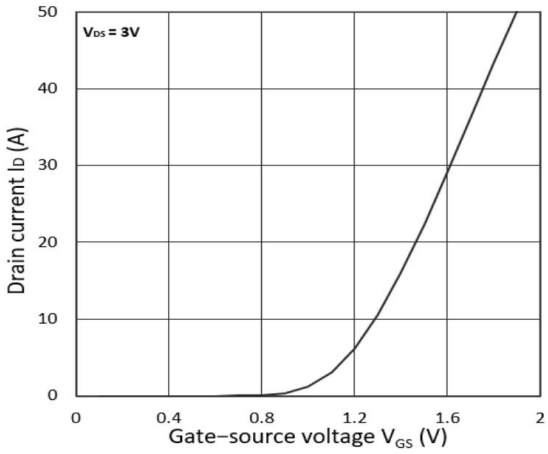



Figure 2. Transfer Characteristics

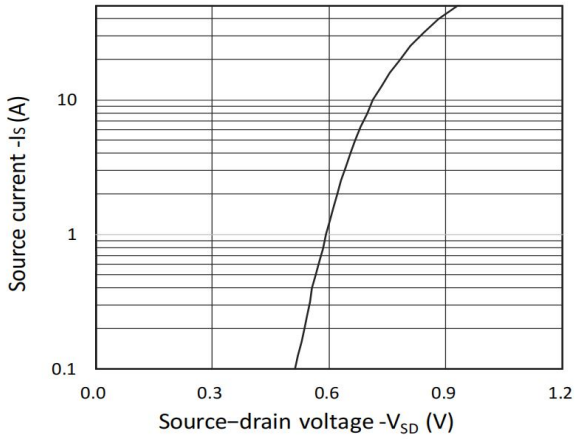



Figure 3. Forward Characteristics of Reverse

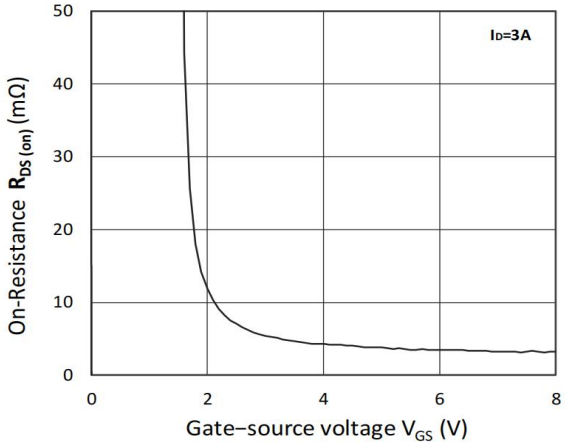



Figure 4. $R_{DS(ON)}$ vs. $V_{GS}$

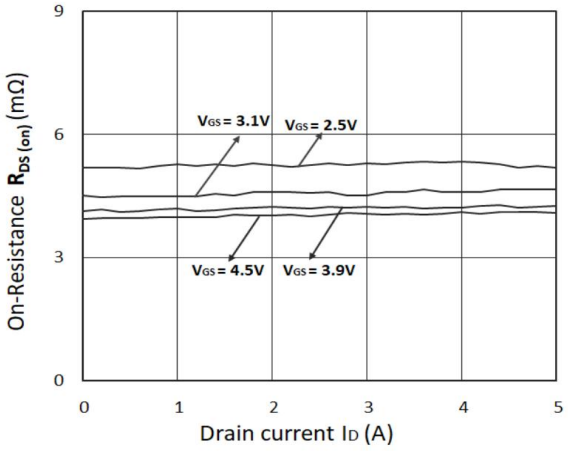



Figure 5. $R_{DS(ON)}$ vs. $I_D$

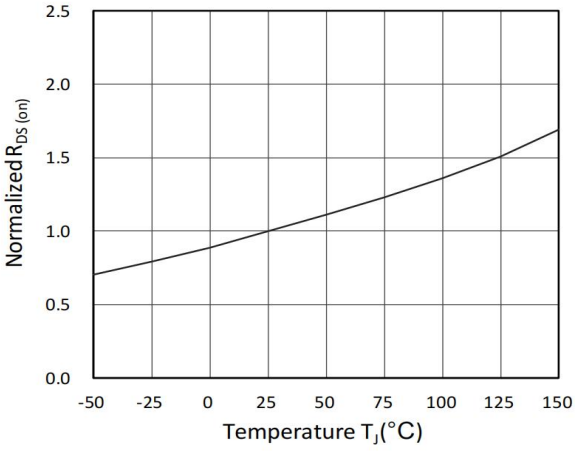



Figure 6. Capacitance Characteristics

## Typical Characteristics

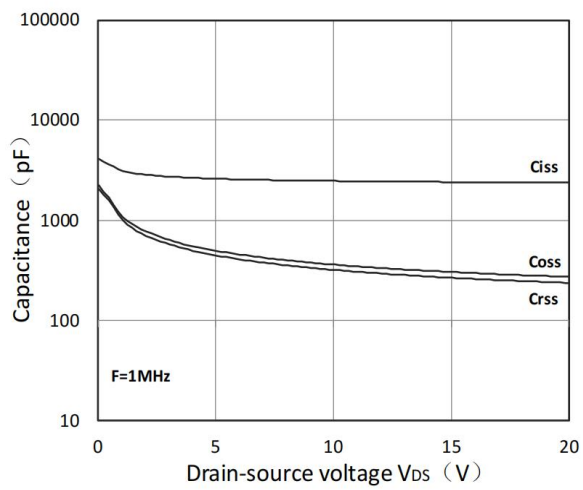



Figure 7. Capacitance Characteristics

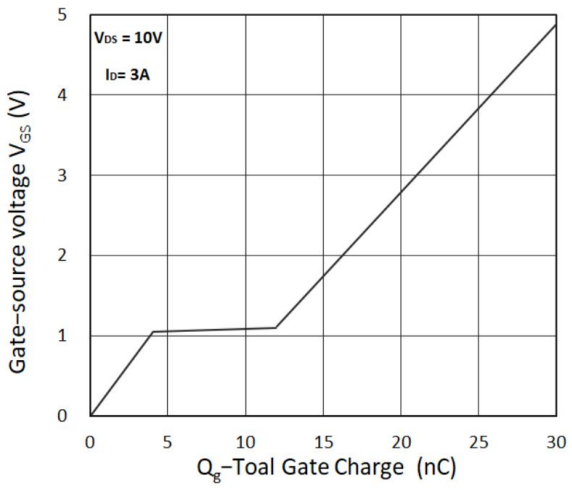



Figure 8. Gate Charge Characteristics

## Marking Codes

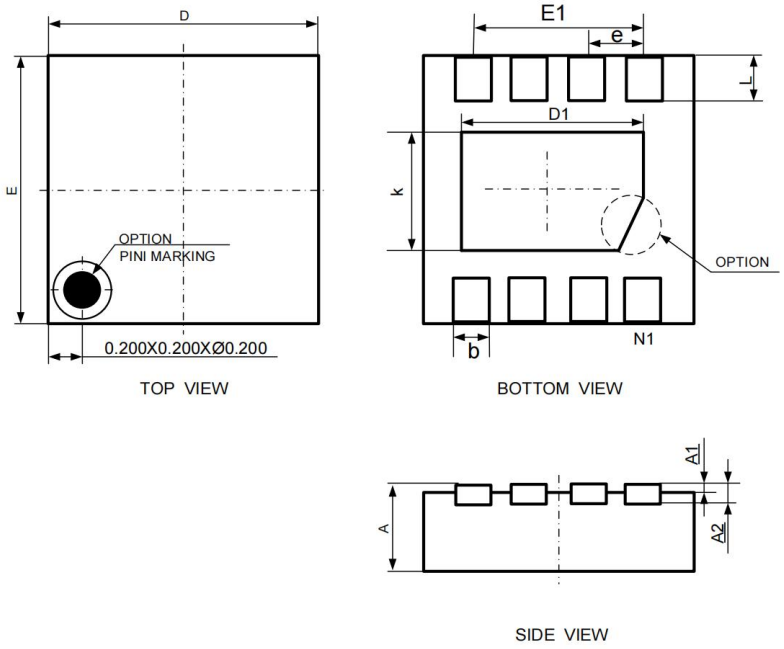
| Part Number | CT56N02DZT |
|---|---|
| Marking Code |  56N02D = Device code<br>XXXX XXX= Date code |

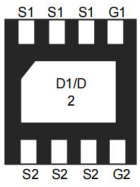
## Package Information

Qty： 3k/Reel

## Outline Drawing -DFN3030-8L

### PACKAGE OUTLINE



DFN3030-8L

DIMENSIONS

| SYMBOL | MILLIMETER | | INCHES | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | 0.70 | 0.80 | 0.027 | 0.031 |
| A1 | 0.00 | 0.05 | 0.000 | 0.002 |
| A2 | 0.203 | | 0.008 | |
| D | 2.90 | 3.10 | 0.114 | 0.122 |
| E | 2.90 | 3.10 | 0.114 | 0.122 |
| E1 | 1.95REF | | 0.077BSC | |
| D1 | 2.20 | 2.40 | 0.087 | 0.094 |
| K | 1.40 | 1.60 | 0.055 | 0.063 |
| b | 0.25 | 0.35 | 0.009 | 0.014 |
| e | 0.65 BSC. | | 0.026BSC | |
| L | 0.35 | 0.45 | 0.014 | 0.018 |