# N-Ch 30V Fast Switching MOSFETs

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

## CST20N03DProduct Summary

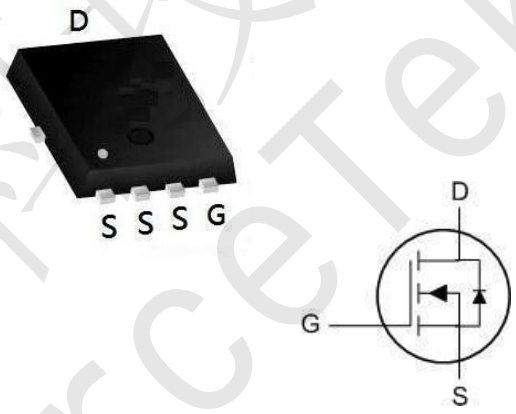
| BVDSS | RDSON | ID |
|---|---|---|
| 30V | 15mΩ | 20A |

## CST20N03D Description

The CST20N03D 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 CST20N03D meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

## CST20N03D PDFN3*3 Pin Configuration




## CST20N03D Absolute Maximum Ratings

| Symbol | Parameter | Rating | | Units |
|---|---|---|---|---|
| | | 10s | Steady State | |
| $V_{DS}$ | Drain-Source Voltage | 30 | | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | | V |
| $I_D$@$T_C$=25℃ | Continuous Drain Current, $V_{GS}$ @ 10V[1] | 20 | | A |
| $I_D$@$T_C$=100℃ | Continuous Drain Current, $V_{GS}$ @ 10V[1] | 8 | | A |
| $I_{DM}$ | Pulsed Drain Current[2] | 38 | | A |
| EAS | Single Pulse Avalanche Energy[3] | 28 | | mJ |
| $I_{AS}$ | Avalanche Current | 13.8 | | A |
| $P_D$@$T_C$=25℃ | Total Power Dissipation[4] | 5.5 | | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 175 | | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 175 | | ℃ |

## CST20N03D Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance Junction-Case[1] | --- | 36 | ℃/W |

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## CST20N03D 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 | 30 | - | - | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=30V, $V_{GS}$ = 0V, | - | - | 1.0 | μA |
| $I_{GSS}$ | Gate to Body Leakage Current | $V_{DS}$=0V, $V_{GS}$ = ±20V | - | - | ±100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=250μA | 1.0 | 1.5 | 2.5 | V |
| $R_{DS(on)}$ | Static Drain-Source on-Resistance note3 | $V_{GS}$=10V, $I_D$=5A | - | 15 | 20 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=3A | - | 21 | 29 | |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=15V, $V_{GS}$=0V, f=1.0MHz | - | 490 | - | pF |
| $C_{oss}$ | Output Capacitance | | - | 79 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 61 | - | pF |
| $Q_g$ | Total Gate Charge | $V_{DS}$=15V, $I_D$=5.8A, $V_{GS}$=10V | - | 10 | - | nC |
| $Q_{gs}$ | Gate-Source Charge | | - | 1.7 | - | nC |
| $Q_{gd}$ | Gate-Drain(“Miller”) Charge | | - | 2.5 | - | nC |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DS}$=15V, $I_D$=3A, $V_{GS}$=10V, $R_{REN}$ =3Ω | - | 6 | - | ns |
| $t_r$ | Turn-on Rise Time | | - | 15 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | | - | 17 | - | ns |
| $t_f$ | Turn-off Fall Time | | - | 17 | - | ns |
| **Drain-Source Diode Characteristics and Maximum Ratings** | | | | | | |
| $I_S$ | Maximum Continuous Drain to Source Diode Forward Current | | - | - | 9 | A |
| $I_{SM}$ | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | 36 | A |
| $V_{SD}$ | Drain to Source Diode Forward Voltage | $V_{GS}$=0V, $I_S$=9A | - | - | 1.2 | V |
| trr | Body Diode Reverse Recovery Time | $I_F$=5A, dI/dt=100A/μs | - | 7 | - | ns |
| Qrr | Body Diode Reverse Recovery Charge | | - | 2 | - | nC |

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

2. EAS condition : $T_J$=25℃,$V_{DD}$=15V,$V_G$=10V,L=0.5mH,Rg=25Ω,$I_{AS}$=6A

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



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# CST20N03D Typical Performance Characteristics

**Figure1:** Output Characteristics

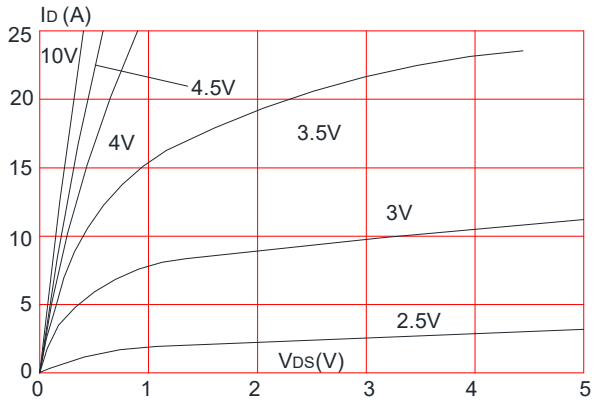


**Figure 2:** Typical Transfer Characteristics

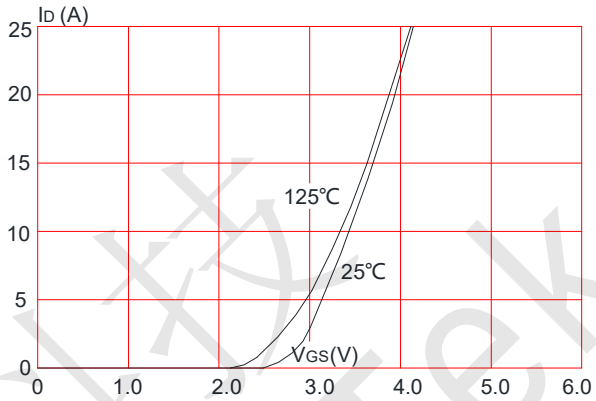


**Figure 3:**On-resistance vs. Drain Current

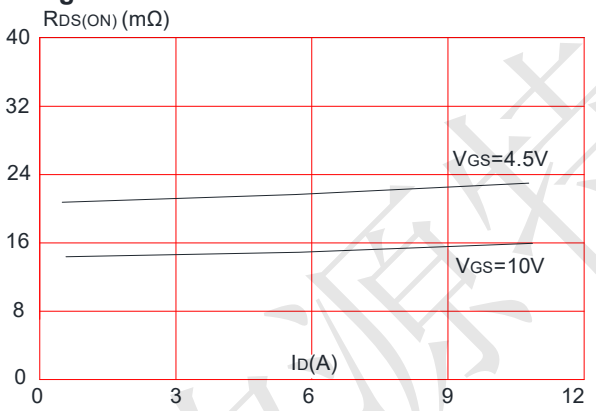


**Figure 4**: Body Diode Characteristics

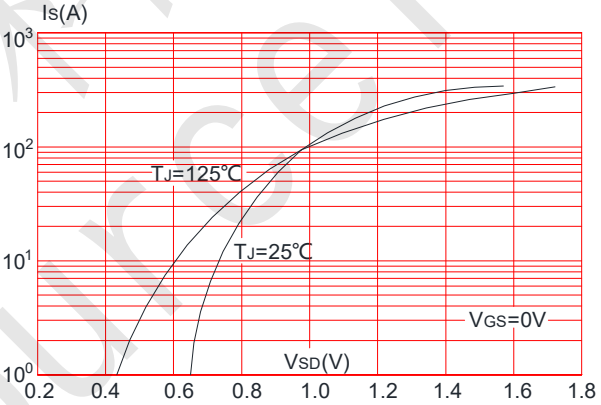


**Figure 5:** Gate Charge Characteristics

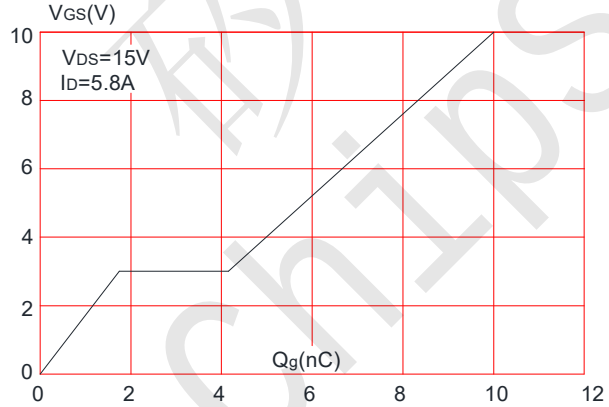


**Figure 6:** Capacitance Characteristics

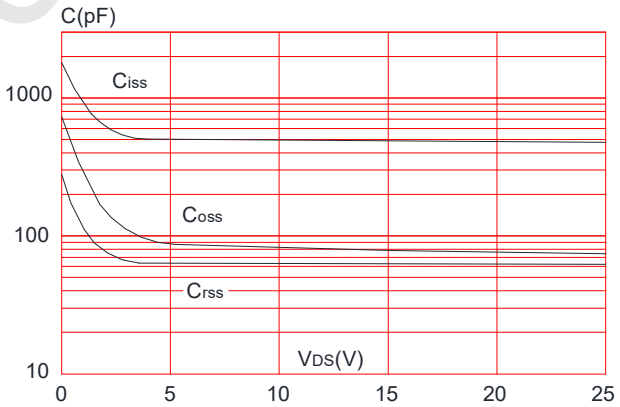




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**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature

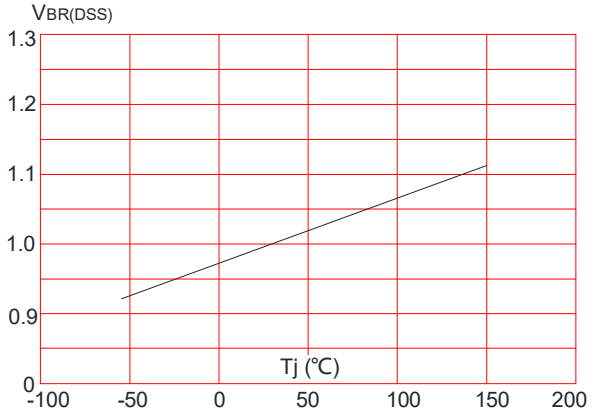



**Figure 8:** Normalized on Resistance vs. Junction Temperature

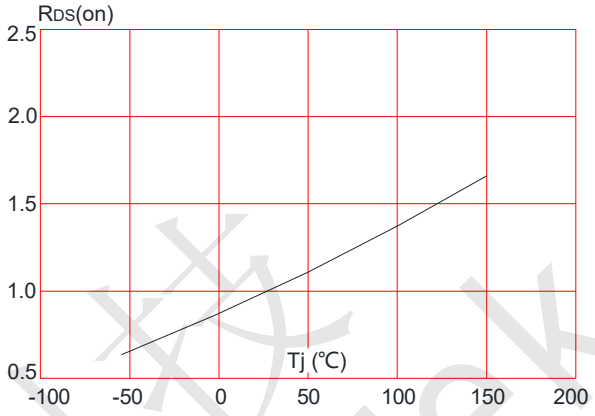



**Figure 9:** Maximum Safe Operating Area

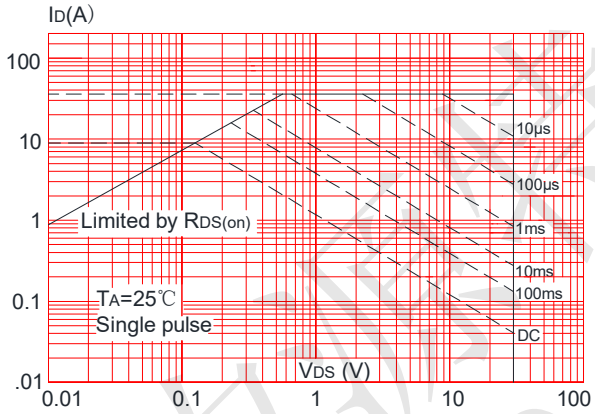



**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature

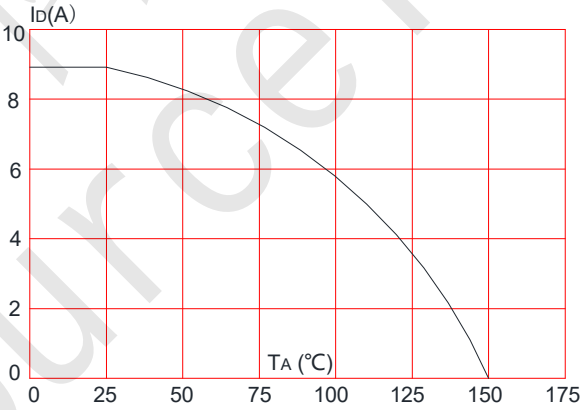
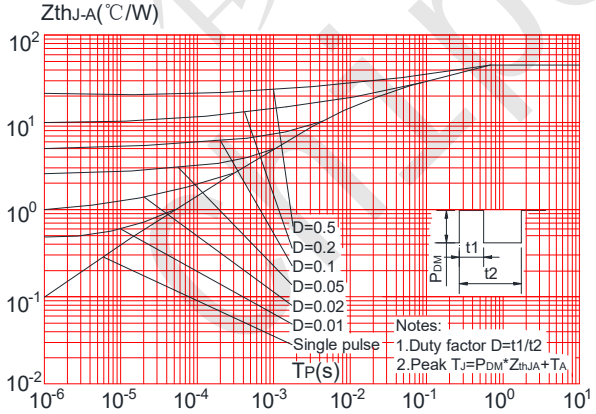



**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



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## CST20N03D Test Circuit

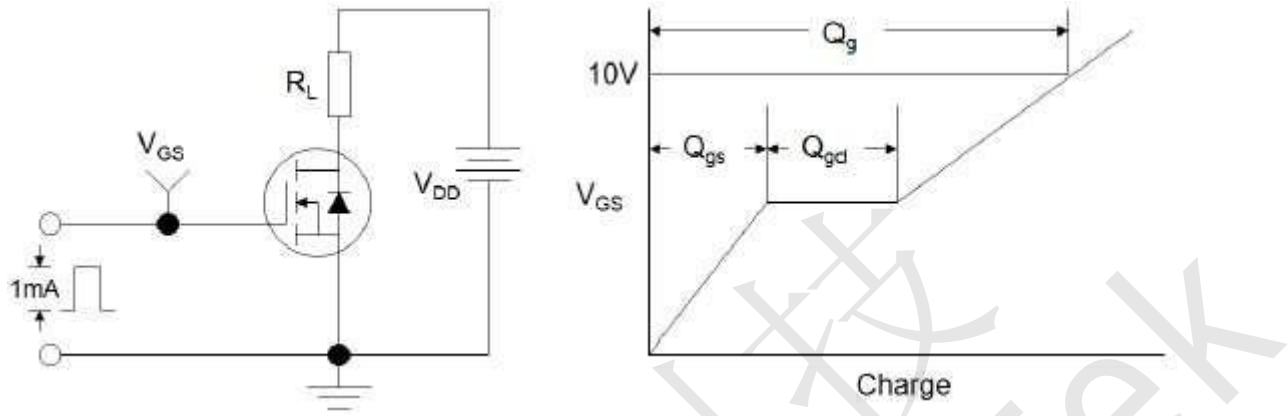



**Figure1:Gate Charge Test Circuit & Waveform**

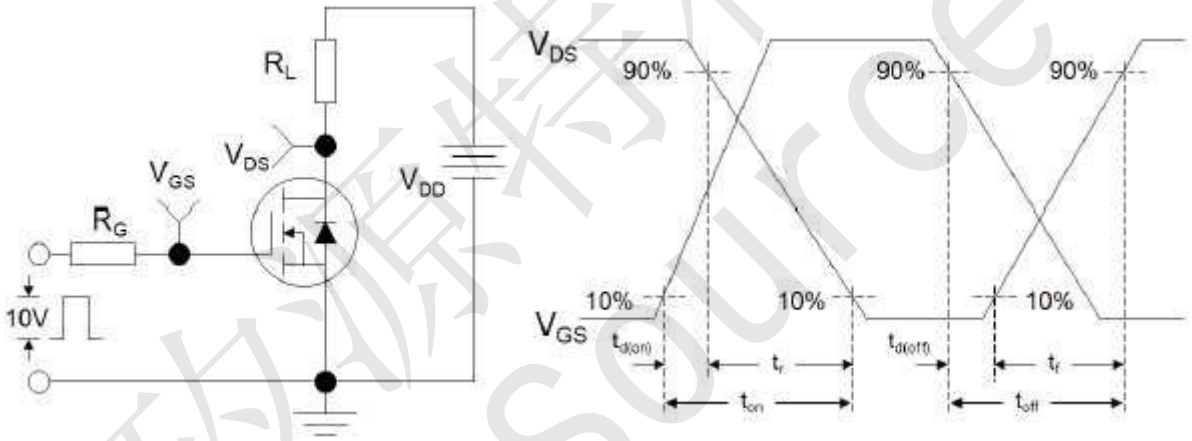



**Figure 2: Resistive Switching Test Circuit & Waveforms**

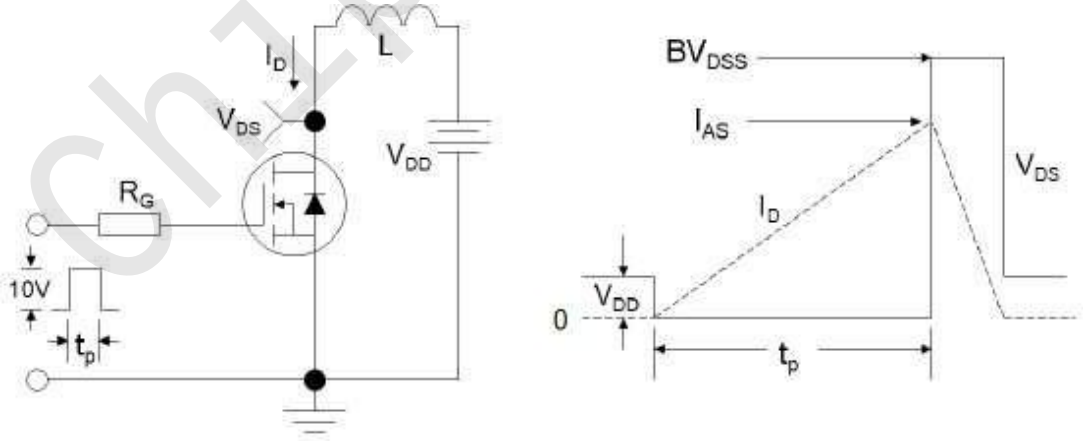
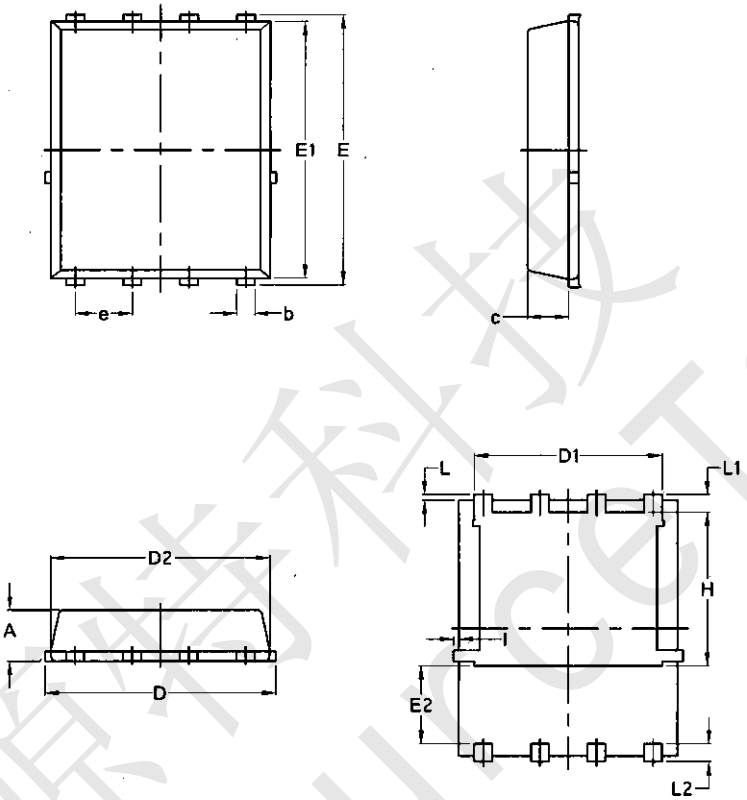



**Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms**

# CST20N03D Package Mechanical Data-PDFN3*3-8L- Single




## COMMON DIMENSIONS

(UNITS OF MEASURE=MILLIMETER)

| SYMBOL | MIN | NOM | MAX |
|---|---|---|---|
| A | 0.70 | 0.80 | 0.90 |
| A1 | 0.00 | 0.03 | 0.05 |
| b | 0.24 | 0.30 | 0.35 |
| c | 0.10 | 0.15 | 0.20 |
| D | 3.25 | 3.32 | 3.40 |
| D1 | 3.05 | 3.15 | 3.25 |
| D2 | 2.40 | 2.50 | 2.60 |
| E | 3.00 | 3.10 | 3.20 |
| E1 | 1.35 | 1.45 | 1.55 |
| e | 0.65 BSC. | | |
| H | 3.20 | 3.30 | 3.40 |
| L | 0.30 | 0.40 | 0.50 |
| L1 | 0.10 | 0.15 | 0.20 |
| L2 | 1.13 REF. | | |



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