



CST30G20

N-Ch and P-Ch Fast Switching MOSFETs

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

Product Summary

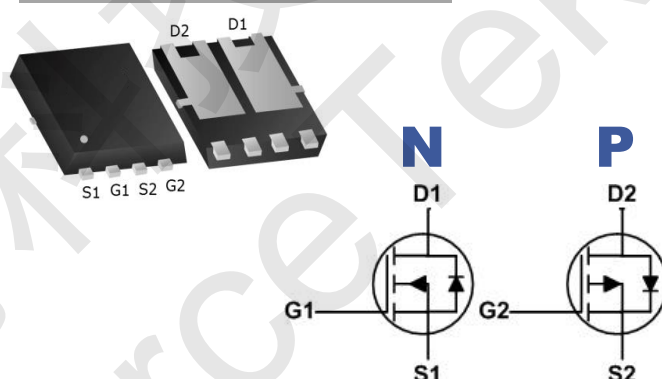


| BVDSS | RDSON | ID |
|-------|-------|------|
| 30V | 14 mΩ | 16A |
| -30V | 25 mΩ | -14A |

Description

The CST30G20 is the high performance complementary N-ch and P-ch MOSFETs with high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications. The CST30G20 meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

PDFN5* 6 Pin Configuration



Absolute Maximum Ratings

| Symbol | Parameter | Rating | | Units |
|-----------------------------|--|------------|------------|------------------|
| | | N-Ch | P-Ch | |
| V_{DS} | Drain-Source Voltage | 30 | -30 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | ± 20 | V |
| $I_D@T_a=25^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 16 | -14 | A |
| $I_D@T_a=100^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 10 | -10 | A |
| I_{DM} | Pulsed Drain Current ² | 46 | -40 | A |
| EAS | Single Pulse Avalanche Energy ³ | 28 | 66 | mJ |
| $P_D@T_c=25^\circ\text{C}$ | Total Power Dissipation ⁴ | 15 | 21.3 | W |
| T_{STG} | Storage Temperature Range | -55 to 150 | -55 to 150 | $^\circ\text{C}$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | -55 to 150 | $^\circ\text{C}$ |

Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|-----------------|--|------|------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient ¹ | --- | 45 | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case ¹ | --- | 5 | $^\circ\text{C/W}$ |



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N-Channel Electrical Characteristics (T_J=25 °C, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|--|--|------|-------|------|-------|
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =250uA | 30 | --- | --- | V |
| ΔBV _{DSS} /ΔT _J | BVDSS Temperature Coefficient | Reference to 25°C, I _D =1mA | --- | 0.023 | --- | V/°C |
| R _{DS(ON)} | Static Drain-Source On-Resistance ² | V _{GS} =10V, I _D =10A | --- | 14 | 20 | mΩ |
| | | V _{GS} =4.5V, I _D =6A | --- | 20 | 25 | |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250uA | 1.0 | --- | 2.5 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | -4.2 | --- | mV/°C |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =24V, V _{GS} =0V, T _J =25°C | --- | --- | 1 | uA |
| | | V _{DS} =24V, V _{GS} =0V, T _J =55°C | --- | --- | 5 | |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} =±20V, V _{DS} =0V | --- | --- | ±100 | nA |
| g _{fs} | Forward Transconductance | V _{DS} =5V, I _D =10A | --- | 14 | --- | S |
| R _g | Gate Resistance | V _{DS} =0V, V _{GS} =0V, f=1MHz | --- | 2.3 | --- | Ω |
| Q _g | Total Gate Charge (4.5V) | V _{DS} =20V, V _{GS} =4.5V, I _D =10A | --- | 5 | --- | nC |
| Q _{gs} | Gate-Source Charge | | --- | 1.11 | --- | |
| Q _{gd} | Gate-Drain Charge | | --- | 2.61 | --- | |
| T _{d(on)} | Turn-On Delay Time | V _{DD} =12V, V _{GS} =10V, R _G =3.3Ω I _D =6A | --- | 7.7 | --- | ns |
| T _r | Rise Time | | --- | 46 | --- | |
| T _{d(off)} | Turn-Off Delay Time | | --- | 11 | --- | |
| T _f | Fall Time | | --- | 3.6 | --- | |
| C _{iss} | Input Capacitance | V _{DS} =15V, V _{GS} =0V, f=1MHz | --- | 416 | --- | pF |
| C _{oss} | Output Capacitance | | --- | 62 | --- | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 51 | --- | |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|--|---|------|------|------|------|
| I _S | Continuous Source Current ^{1,5} | V _G =V _D =0V, Force Current | --- | --- | 16 | A |
| I _{SM} | Pulsed Source Current ^{2,5} | | --- | --- | 30 | A |
| V _{SD} | Diode Forward Voltage ² | V _{GS} =0V, I _S =1A, T _J =25°C | --- | --- | 1.2 | V |

Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper.
- 2.The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- 3.The EAS data shows Max. rating. The test condition is V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=12.7A
- 4.The power dissipation is limited by 150°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.



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N-Ch and P-Ch Fast Switching MOSFETs

P-Channel Electrical Characteristics (T_J=25 °C, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|--|--|------|--------|------|-------|
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =-250uA | -30 | --- | --- | V |
| ΔBV _{DSS} /ΔT _J | BV _{DSS} Temperature Coefficient | Reference to 25°C, I _D =-1mA | --- | -0.021 | --- | V/°C |
| R _{DS(ON)} | Static Drain-Source On-Resistance ² | V _{GS} =-10V, I _D =-8A | --- | 25 | 30 | mΩ |
| | | V _{GS} =-4.5V, I _D =-6A | --- | 30 | 35 | |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =-250uA | -1.0 | --- | -2.5 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | -4.2 | --- | mV/°C |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =-24V, V _{GS} =0V, T _J =25°C | --- | --- | 1 | uA |
| | | V _{DS} =-24V, V _{GS} =0V, T _J =55°C | --- | --- | 5 | |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} =±20V, V _{DS} =0V | --- | --- | ±100 | nA |
| g _{fs} | Forward Transconductance | V _{DS} =-5V, I _D =-8A | --- | 12.6 | --- | S |
| R _g | Gate Resistance | V _{DS} =0V, V _{GS} =0V, f=1MHz | --- | 15 | --- | Ω |
| Q _g | Total Gate Charge (-4.5V) | V _{DS} =-20V, V _{GS} =-4.5V, I _D =-6A | --- | 9.8 | --- | nC |
| Q _{gs} | Gate-Source Charge | | --- | 2.2 | --- | |
| Q _{gd} | Gate-Drain Charge | | --- | 3.4 | --- | |
| T _{d(on)} | Turn-On Delay Time | V _{DD} =-24V, V _{GS} =-10V, R _G =3.3Ω, I _D =-1A | --- | 16.4 | --- | ns |
| T _r | Rise Time | | --- | 20.2 | --- | |
| T _{d(off)} | Turn-Off Delay Time | | --- | 55 | --- | |
| T _f | Fall Time | | --- | 10 | --- | |
| C _{iss} | Input Capacitance | V _{DS} =-15V, V _{GS} =0V, f=1MHz | --- | 930 | --- | pF |
| C _{oss} | Output Capacitance | | --- | 148 | --- | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 115 | --- | |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|--|--|------|------|------|------|
| I _S | Continuous Source Current ^{1,5} | V _G =V _D =0V, Force Current | --- | --- | -14 | A |
| I _{SM} | Pulsed Source Current ^{2,5} | | --- | --- | -24 | A |
| V _{SD} | Diode Forward Voltage ² | V _{GS} =0V, I _S =-1A, T _J =25°C | --- | --- | -1.2 | V |

Note :

1. The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper.
2. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
3. The EAS data shows Max. rating. The test condition is V_{DD}=-25V, V_{GS}=-10V, L=0.1mH, I_{AS}=-30A
4. The power dissipation is limited by 150°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.



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N-Ch and P-Ch Fast Switching MOSFETs

N-Channel Typical Characteristics

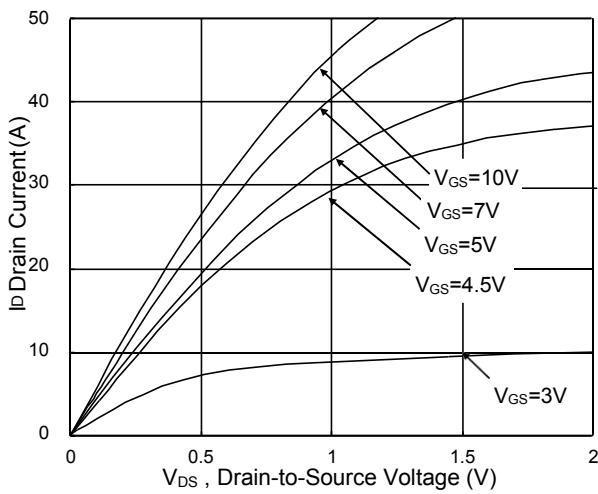


Fig.1 Typical Output Characteristics

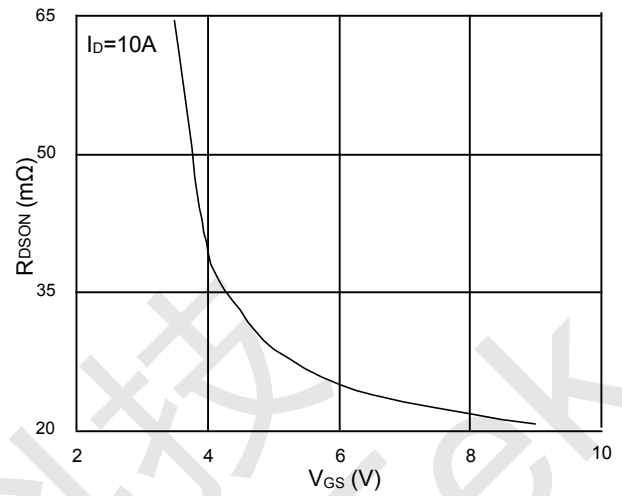


Fig.2 On-Resistance vs. Gate-Source

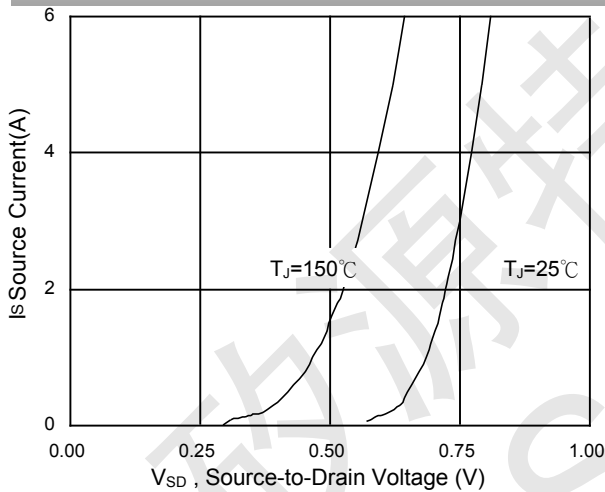


Fig.3 Forward Characteristics Of Reverse

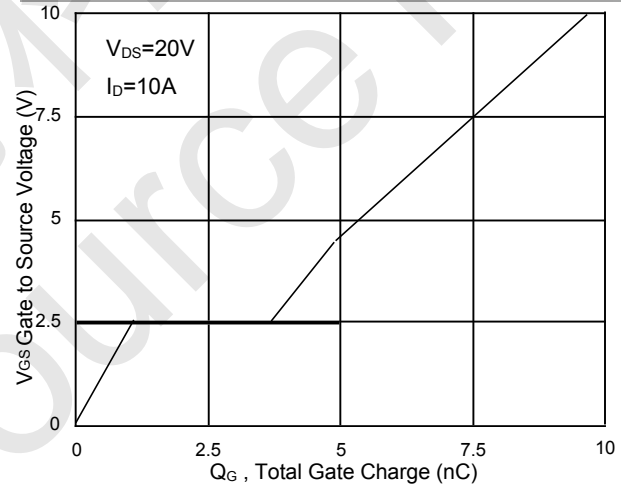


Fig.4 Gate-Charge Characteristics

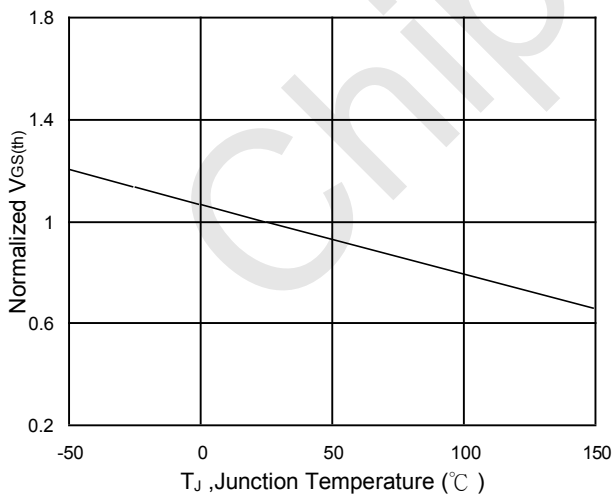


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

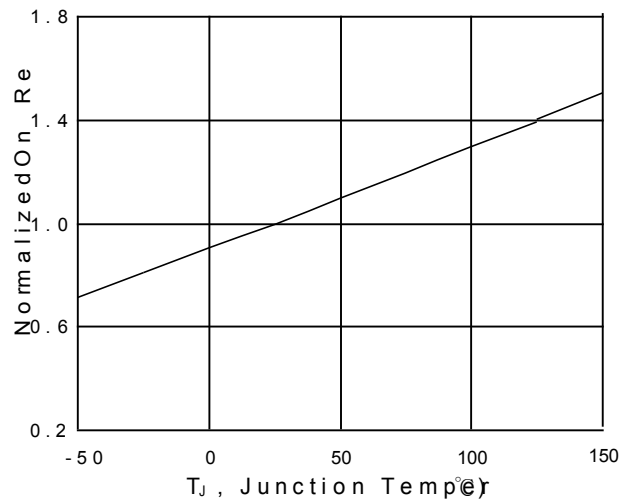


Fig.6 Normalized $R_{DS(on)}$ vs. T_J



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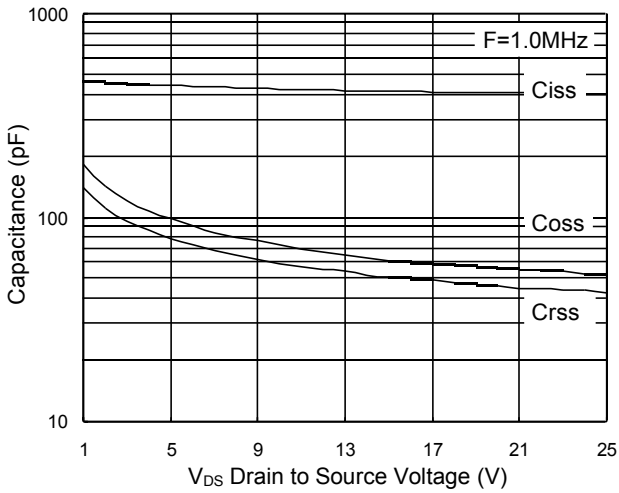


Fig.7 Capacitance

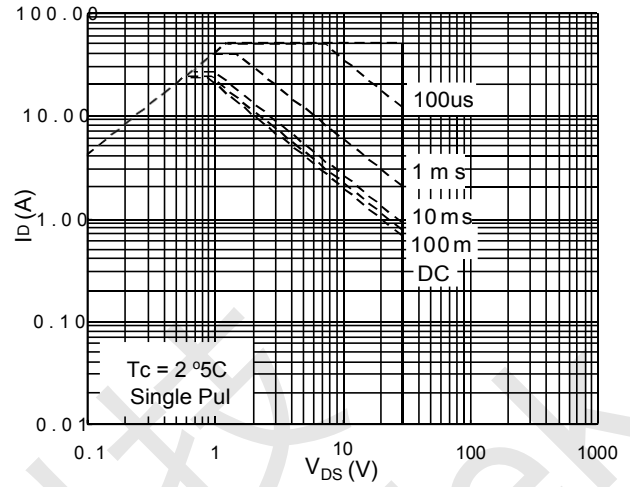


Fig.8 Safe Operating Area

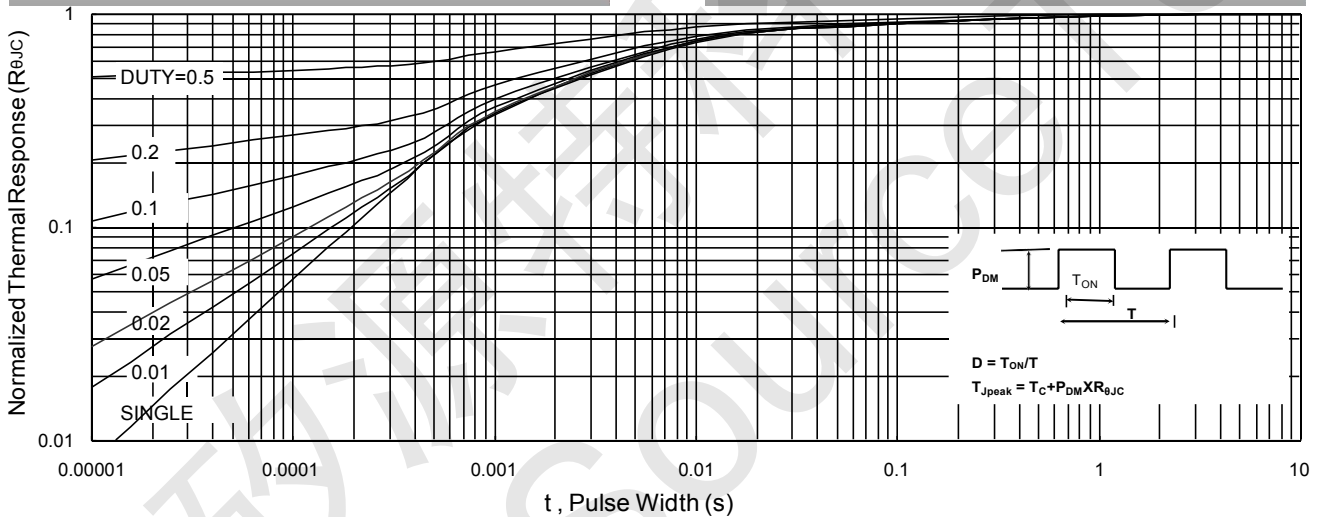
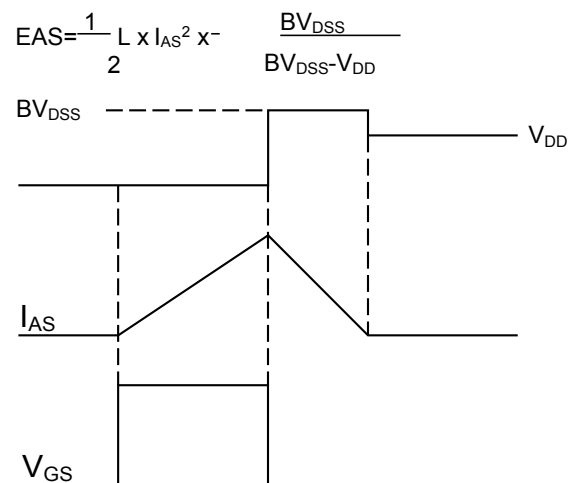
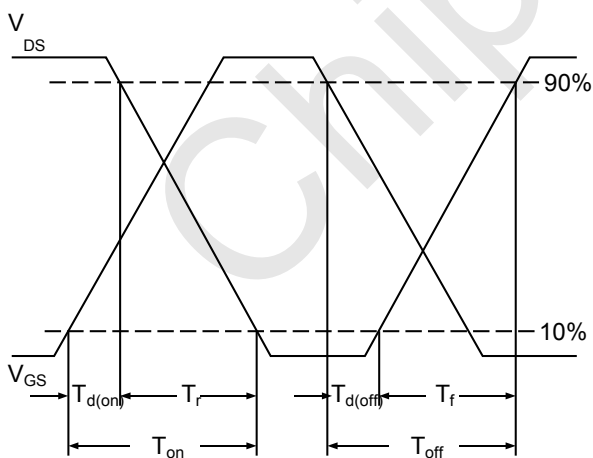


Fig.9 Normalized Maximum Transient Thermal Impedance





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P-Channel Typical Characteristics

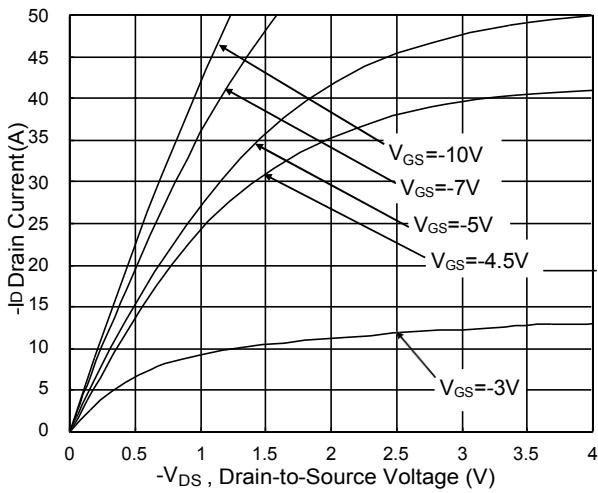


Fig.1 Typical Output Characteristics

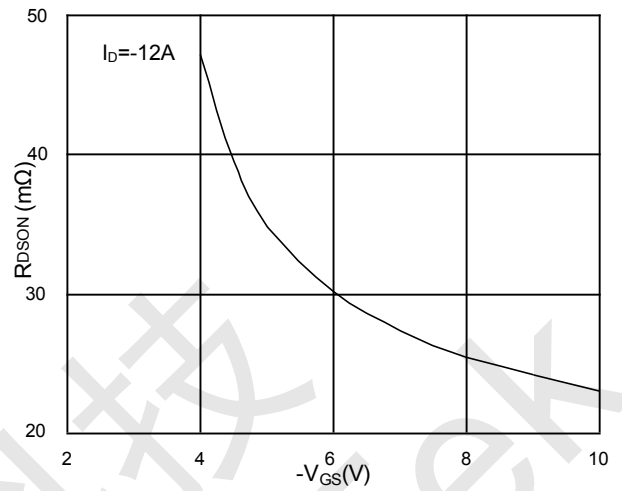


Fig.2 On-Resistance v.s Gate-Source

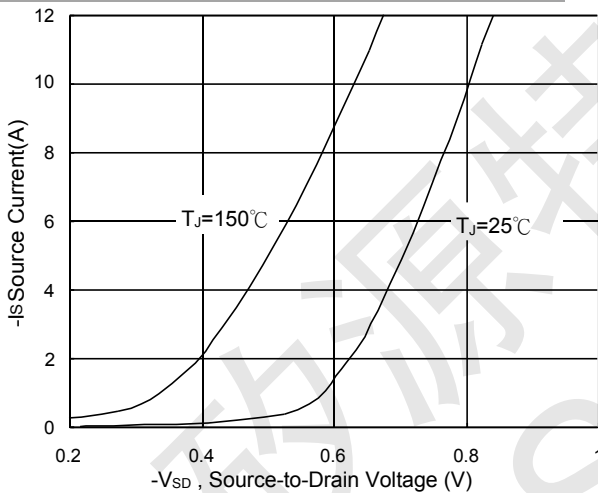


Fig.3 Forward Characteristics Of Reverse

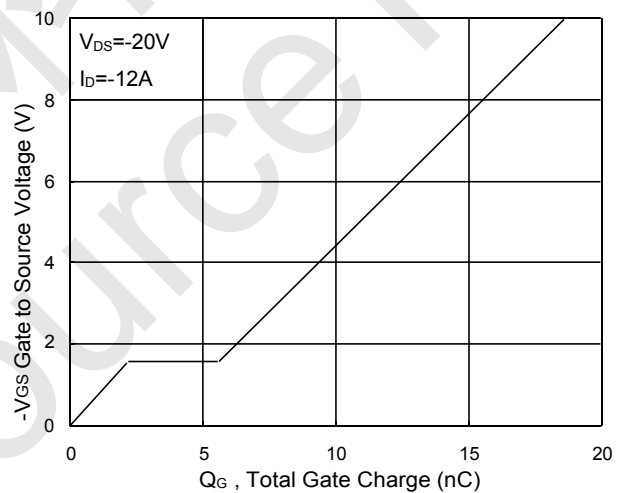


Fig.4 Gate-Charge Characteristics

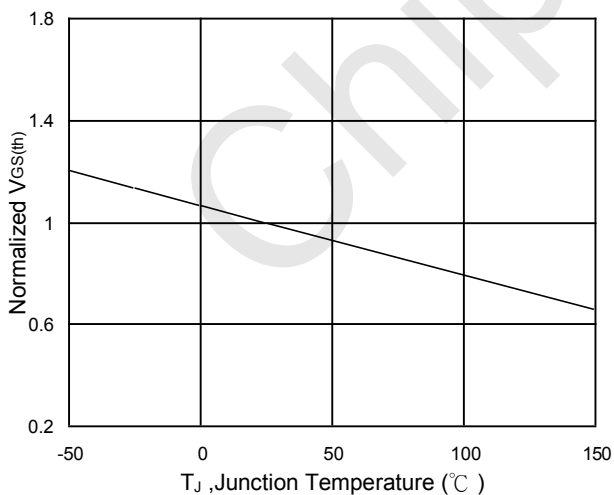


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

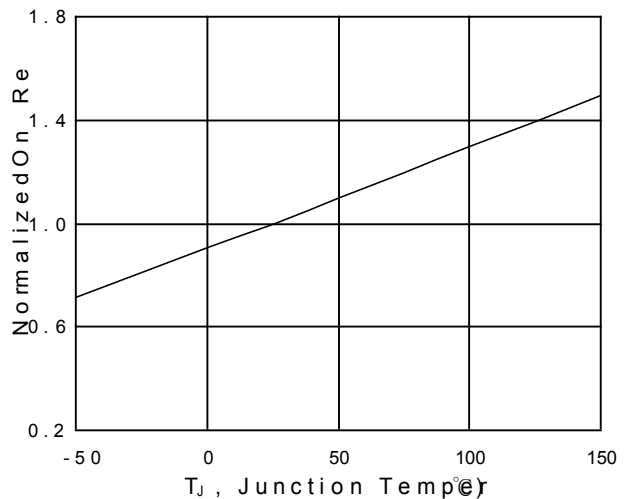


Fig.6 Normalized $R_{DS(on)}$ vs. T_J



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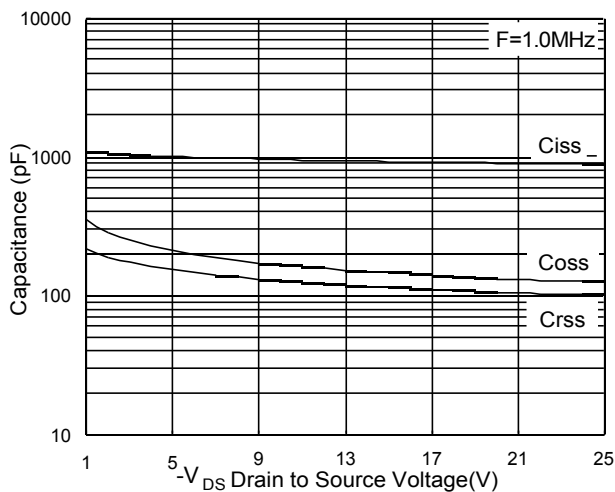


Fig.7 Capacitance

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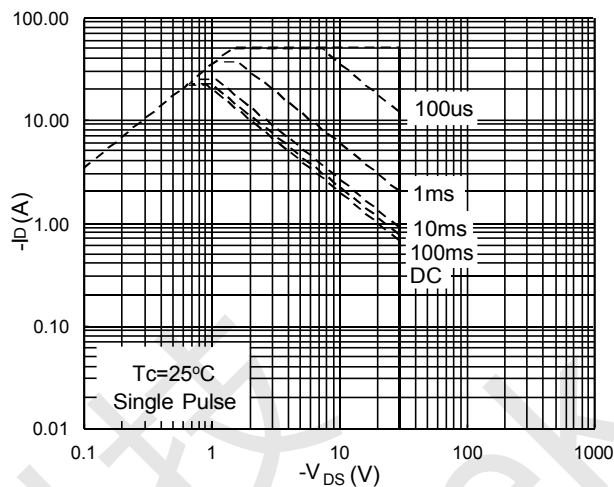


Fig.8 Safe Operating Area

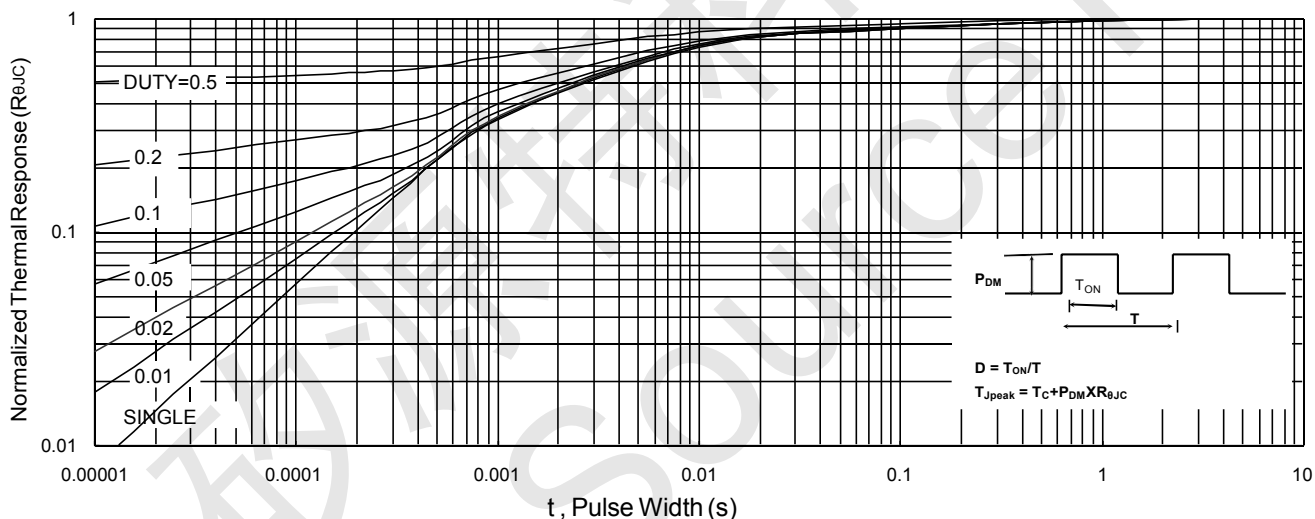


Fig.9 Normalized Maximum Transient Thermal Impedance

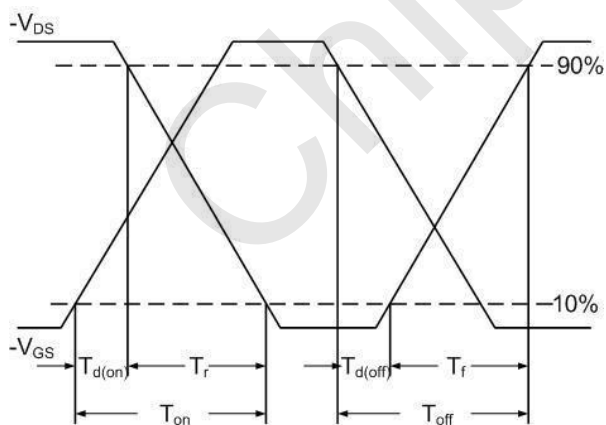


Fig 10 Switching Time Waveform

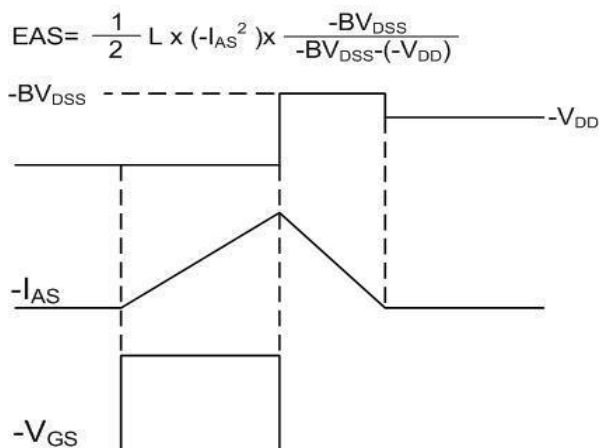


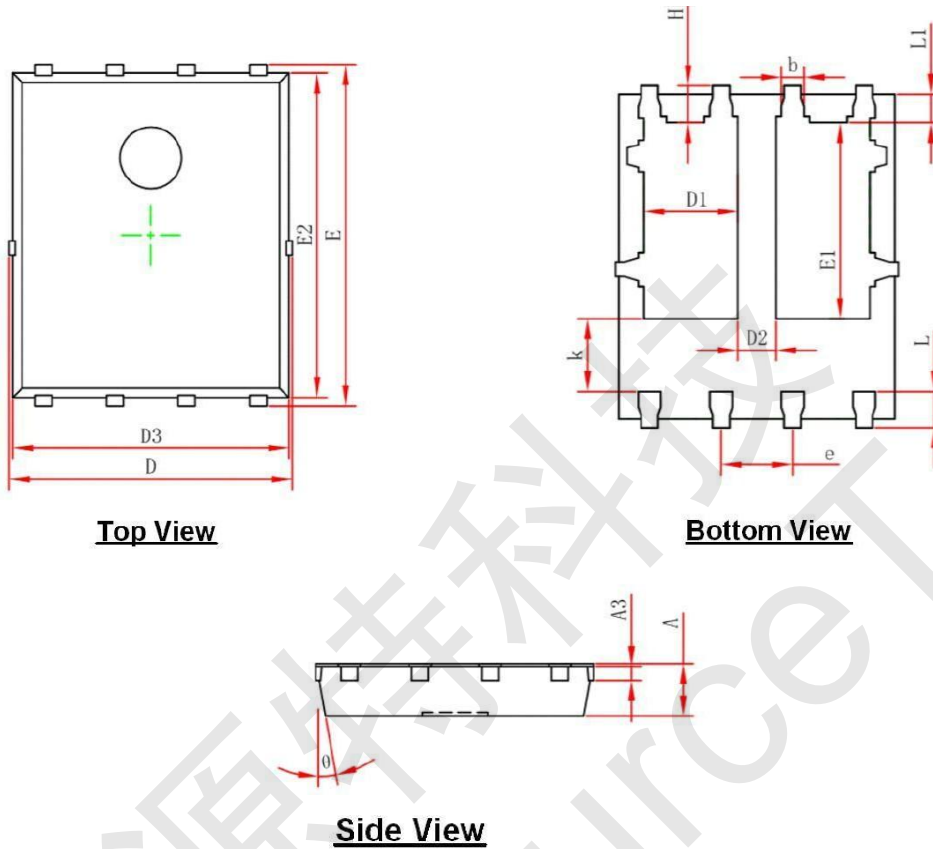
Fig 11 Unclamped Inductive Switching Waveform



CST30G20

N-Ch and P-Ch Fast Switching MOSFETs

Package Mechanical Data- PDFN5X6-8L



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|----------|---------------------------|-------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 0.900 | 1.000 | 0.035 | 0.039 |
| A3 | 0.154REF. | | 0.006REF. | |
| D | 4.944 | 5.096 | 0.195 | 0.201 |
| E | 5.974 | 6.126 | 0.235 | 0.241 |
| D1 | 1.470 | 1.870 | 0.058 | 0.074 |
| D2 | 0.470 | 0.870 | 0.019 | 0.034 |
| E1 | 3.375 | 3.575 | 0.133 | 0.141 |
| D3 | 4.824 | 4.976 | 0.190 | 0.196 |
| E2 | 5.674 | 5.826 | 0.223 | 0.229 |
| k | 1.190 | 1.390 | 0.047 | 0.055 |
| b | 0.350 | 0.450 | 0.014 | 0.018 |
| e | 1.270TYP. | | 0.050TYP. | |
| L | 0.559 | 0.711 | 0.022 | 0.028 |
| L1 | 0.424 | 0.576 | 0.017 | 0.023 |
| H | 0.574 | 0.726 | 0.023 | 0.029 |
| θ | 10° | 12° | 10° | 12° |