



P-Ch 60V Fast Switching MOSFETs

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

Product Summary

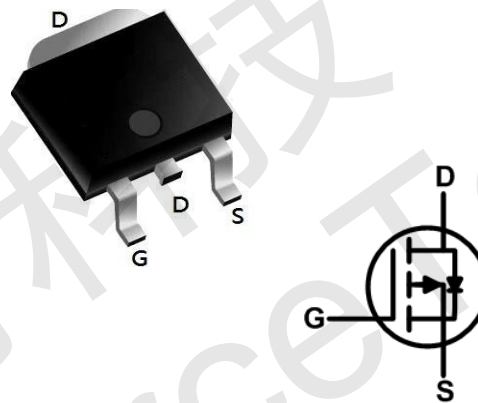


| BVDSS | RDSON | ID |
|-------|-------|------|
| -60V | 48mΩ | -20A |

Description

The CST20P06 is the high cell density trenched P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications. The CST20P06 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 | -60 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| $I_D@T_C=25^\circ C$ | Continuous Drain Current, $V_{GS} @ -10V^1$ | -20 | A |
| $I_D@T_C=100^\circ C$ | Continuous Drain Current, $V_{GS} @ -10V^1$ | -12 | A |
| $I_D@T_A=25^\circ C$ | Continuous Drain Current, $V_{GS} @ -10V^1$ | -4.5 | A |
| $I_D@T_A=70^\circ C$ | Continuous Drain Current, $V_{GS} @ -10V^1$ | -4.0 | A |
| I_{DM} | Pulsed Drain Current ² | -30 | A |
| EAS | Single Pulse Avalanche Energy ³ | 18.1 | mJ |
| I_{AS} | Avalanche Current | -13 | A |
| $P_D@T_C=25^\circ C$ | Total Power Dissipation ⁴ | 25 | W |
| $P_D@T_A=25^\circ C$ | Total Power Dissipation ⁴ | 2 | 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 |
|-----------------|--|------|------|--------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient ¹ | --- | 62 | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case ¹ | --- | 5 | $^\circ C/W$ |



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Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------------------------|--|---|------|--------|-----------|----------------------------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=-250\mu A$ | -60 | --- | --- | V |
| $\Delta BV_{DSS}/\Delta T_J$ | BV_{DSS} Temperature Coefficient | Reference to 25°C , $I_D=-1\text{mA}$ | --- | -0.023 | --- | $V/^\circ\text{C}$ |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance ² | $V_{GS}=-10V, I_D=-10A$ | --- | 70 | 85 | m Ω |
| | | $V_{GS}=-4.5V, I_D=-6A$ | --- | 83 | 90 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}=V_{DS}, I_D=-250\mu A$ | -1.2 | --- | -2.5 | V |
| $\Delta V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | --- | 4 | --- | $\text{mV}/^\circ\text{C}$ |
| I_{DSS} | Drain-Source Leakage Current | $V_{DS}=-24V, V_{GS}=0V, T_J=25^\circ\text{C}$ | --- | --- | -1 | μA |
| | | $V_{DS}=-24V, V_{GS}=0V, T_J=55^\circ\text{C}$ | --- | --- | -5 | |
| I_{GSS} | Gate-Source Leakage Current | $V_{GS}=\pm 20V, V_{DS}=0V$ | --- | --- | ± 100 | nA |
| gfs | Forward Transconductance | $V_{DS}=-5V, I_D=-15A$ | --- | 12 | --- | S |
| Q_g | Total Gate Charge (-4.5V) | $V_{DS}=-15V, V_{GS}=-4.5V, I_D=-15A$ | --- | 6.1 | --- | nC |
| Q_{gs} | Gate-Source Charge | | --- | 3.1 | --- | |
| Q_{gd} | Gate-Drain Charge | | --- | 1.8 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DD}=-15V, V_{GS}=-10V, R_G=3.3\Omega, I_D=-15A$ | --- | 2.6 | --- | ns |
| T_r | Rise Time | | --- | 8.6 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 33.6 | --- | |
| T_f | Fall Time | | --- | 6 | --- | |
| C_{iss} | Input Capacitance | $V_{DS}=-15V, V_{GS}=0V, f=1\text{MHz}$ | --- | 585 | --- | pF |
| C_{oss} | Output Capacitance | | --- | 100 | --- | |
| C_{rss} | Reverse Transfer Capacitance | | --- | 85 | --- | |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|----------|--|--|------|------|------|------|
| I_S | Continuous Source Current ^{1,5} | $V_G=V_D=0V$, Force Current | --- | --- | -20 | A |
| I_{SM} | Pulsed Source Current ^{2,5} | | --- | --- | -30 | A |
| V_{SD} | Diode Forward Voltage ² | $V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$ | --- | --- | -1.2 | V |
| t_{rr} | Reverse Recovery Time | $I_F=-15A, dI/dt=100A/\mu s, T_J=25^\circ\text{C}$ | --- | 6.1 | --- | nS |
| Q_{rr} | Reverse Recovery Charge | $T_J=25^\circ\text{C}$ | --- | 1.4 | --- | nC |

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 $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is $V_{DD}=-25V, V_{GS}=-10V, L=0.1\text{mH}, I_{AS}=-19A$
- 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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Typical Characteristics

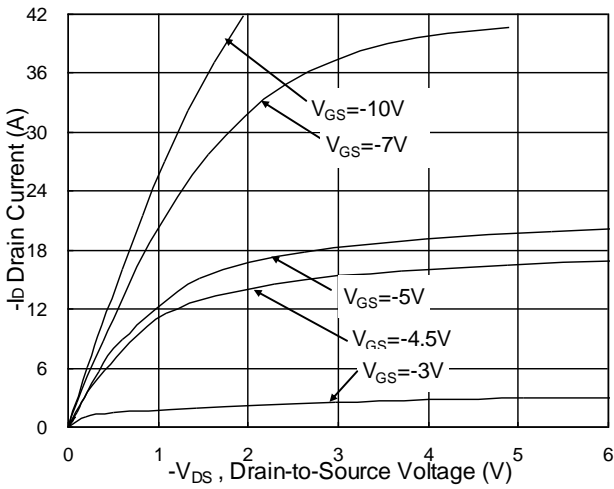


Fig.1 Typical Output Characteristics

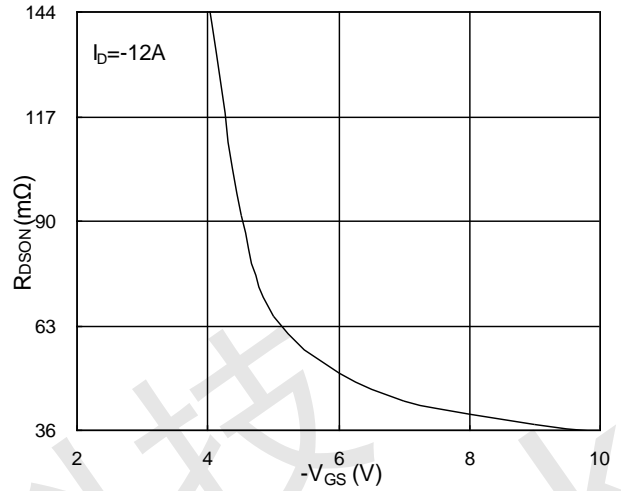


Fig.2 On-Resistance v.s Gate-Source

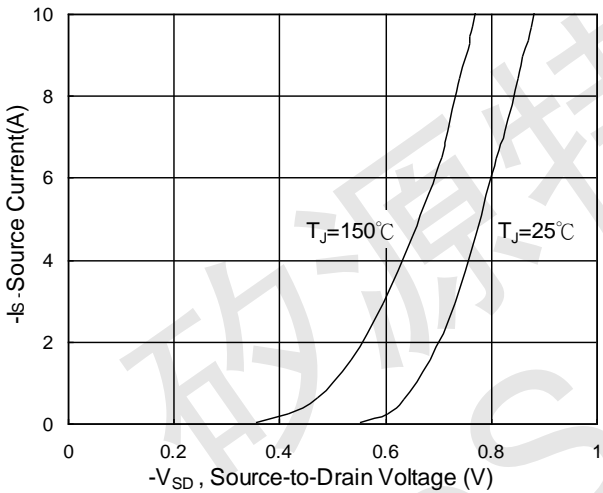


Fig.3 Forward Characteristics Of Reverse

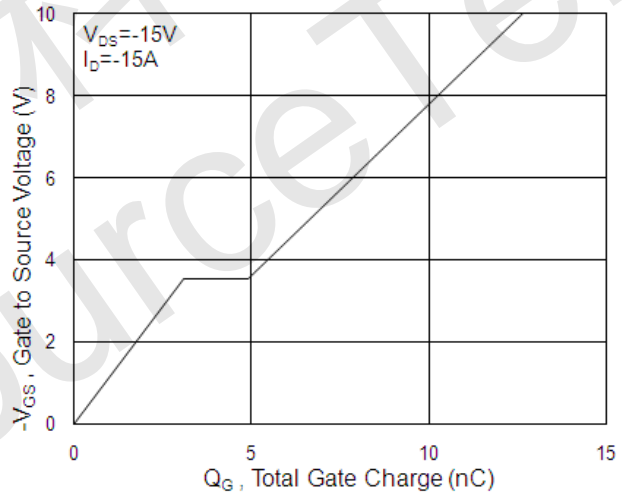


Fig.4 Gate Charge Characteristics

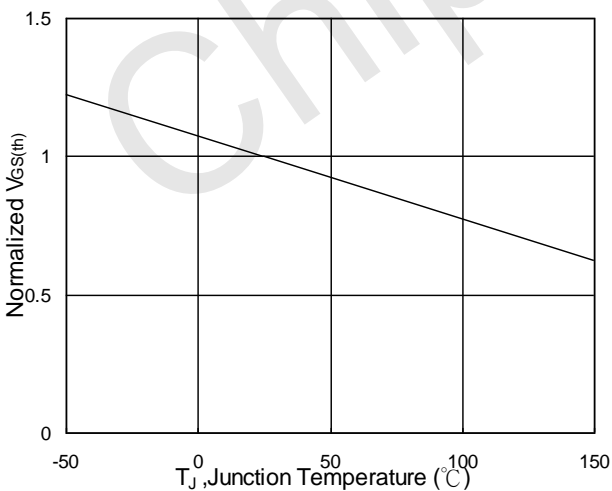


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

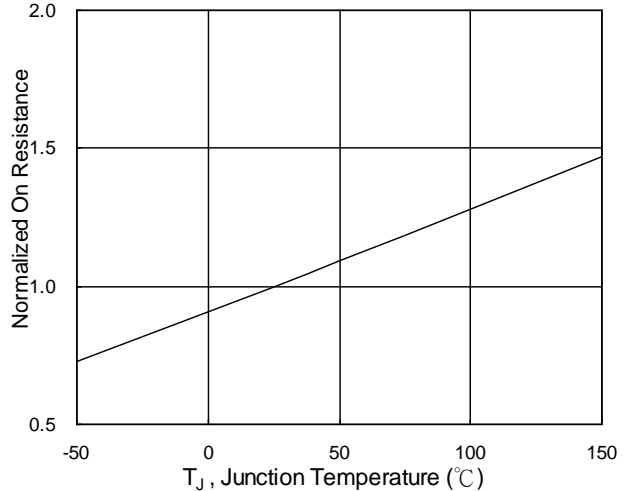


Fig.6 Normalized $R_{DS(on)}$ vs. T_J



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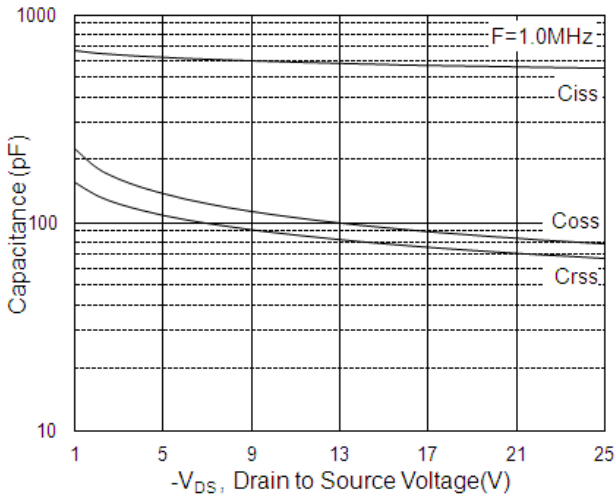


Fig.7 Capacitance

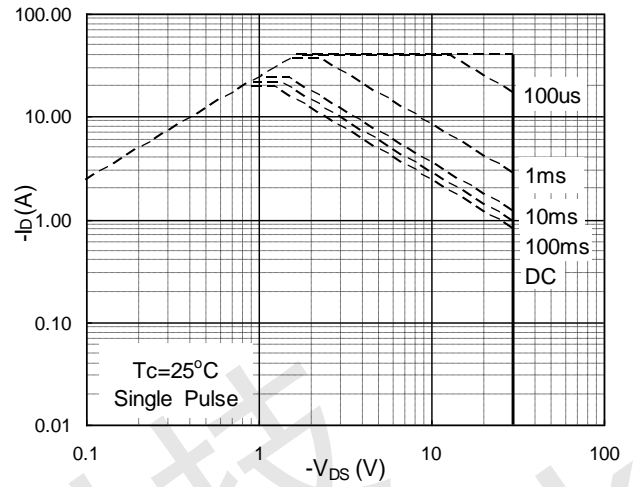


Fig.8 Safe Operating Area

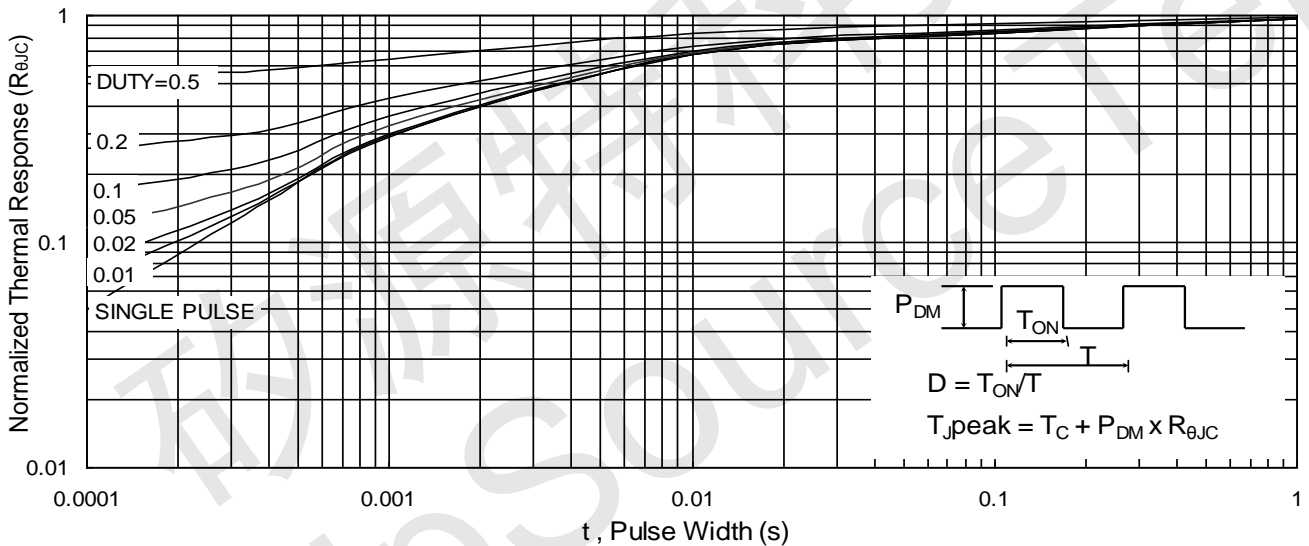


Fig.9 Normalized Maximum Transient Thermal Impedance

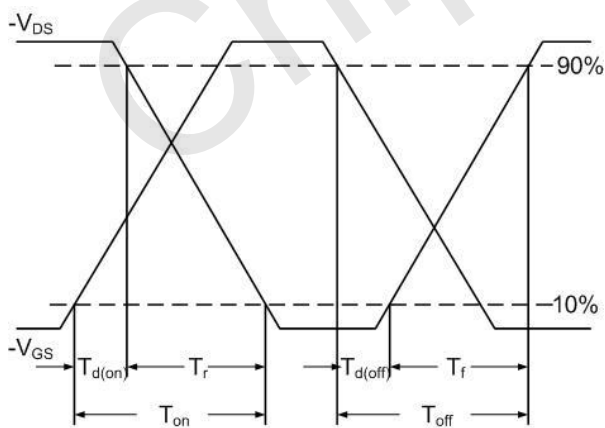


Fig.10 Switching Time Waveform

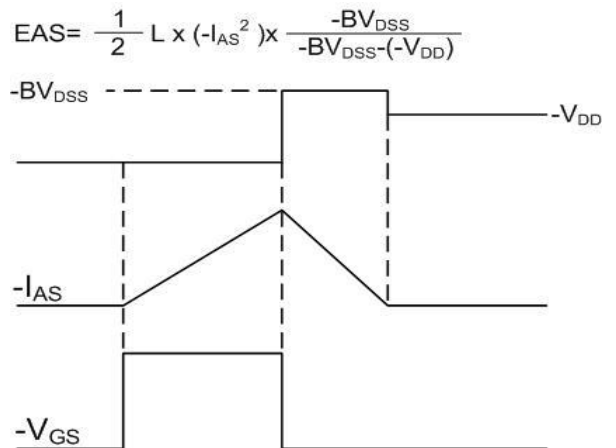
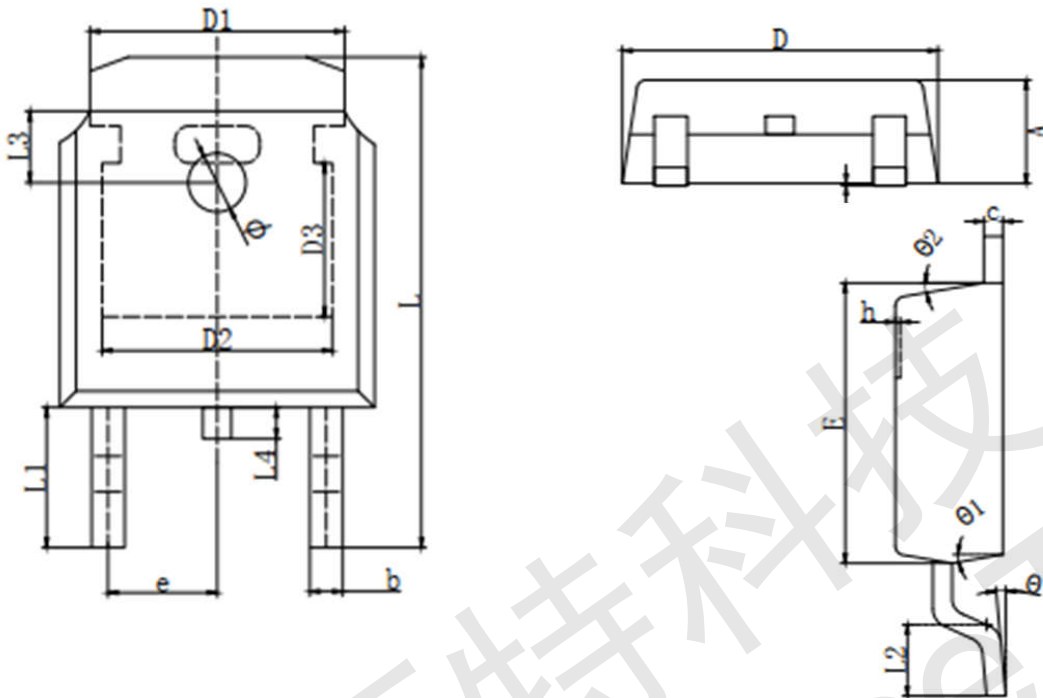


Fig.11 Unclamped Inductive Switching Waveform



TO-252 Package outline



| SYMBOL | MILLIMETER | | SYMBOL | MILLIMETER | |
|--------|------------|-------|------------|------------|-------|
| | MIN | MAX | | MIN | MAX |
| A | 2.200 | 2.400 | h | 0.000 | 0.200 |
| A1 | 0.000 | 0.127 | L | 9.900 | 10.30 |
| b | 0.640 | 0.740 | L1 | 2.898 REF | |
| c | 0.460 | 0.580 | L2 | 1.400 | 1.700 |
| D | 6.500 | 6.700 | L3 | 1.600 REF | |
| D1 | 5.334 REF | | L4 | 0.600 | 1.000 |
| D2 | 4.826 REF | | ϕ | 1.100 | 1.300 |
| D3 | 3.166 REF | | θ | 0° | 8° |
| E | 6.000 | 6.200 | $\theta 1$ | 9° TYP2 | |
| e | 2.286 TYP | | $\theta 2$ | 9° TYP | |