



### CST4614C N-Ch and P-Ch Fast Switching MOSFETs

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

#### CST4614C Product Summary

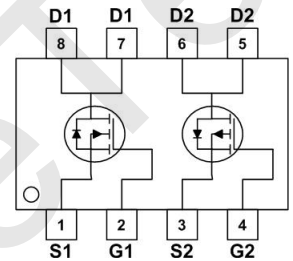
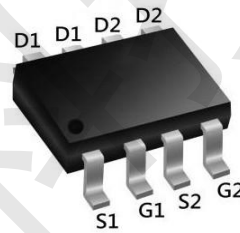


| BVDSS | RDSON | ID    |
|-------|-------|-------|
| 40V   | 26mΩ  | 7.2A  |
| -40V  | 62mΩ  | -5.5A |

#### CST4614C Description

The CST4614C 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 CST4614C meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

#### CST4614C SOP8 Pin Configurations



#### CST4614C Absolute Maximum Ratings

| Symbol                | Parameter                                  | Rating     |            | Units      |
|-----------------------|--|------------|------------|------------|
|                       |  | N-Ch       | P-Ch       |            |
| $V_{DS}$              | Drain-Source Voltage                       | 40         | -40        | V          |
| $V_{GS}$              | Gate-Source Voltage                        | $\pm 20$   | $\pm 20$   | V          |
| $I_D@T_C=25^\circ C$  | Continuous Drain Current, $V_{GS} @ 10V^1$ | 7.2        | -5.5       | A          |
| $I_D@T_C=100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 5.6        | -4.1       | A          |
| $I_{DM}$              | Pulsed Drain Current <sup>2</sup>          | 14.5       | -15        | A          |
| EAS                   | Single Pulse Avalanche Energy <sup>3</sup> | 28         | 26         | mJ         |
| $I_{AS}$              | Avalanche Current                          | 10.8       | -7.2       | A          |
| $P_D@T_C=25^\circ C$  | Total Power Dissipation <sup>4</sup>       | 2.5        | 2.1        | W          |
| $T_{STG}$             | Storage Temperature Range                  | -55 to 150 | -55 to 150 | $^\circ C$ |
| $T_J$                 | Operating Junction Temperature Range       | -55 to 150 | -55 to 150 | $^\circ C$ |



#### CST4614C Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise specified)

| Symbol  | Parameter   | Test Condition   | Min. | Typ. | Max. | Units |
|---|---|--|------|------|------|-------|
| <b>Off Characteristic</b>                                     |   |  |      |      |      |       |
| V <sub>(BR)DSS</sub>  | Drain-Source Breakdown Voltage                            | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA   | 40   | -    | -    | V     |
| I <sub>DSS</sub>  | Zero Gate Voltage Drain Current                           | V <sub>DS</sub> =40V, V <sub>GS</sub> =0V,   | -    | -    | 1.0  | μA    |
| I <sub>GSS</sub>  | Gate to Body Leakage Current                              | V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V  | -    | -    | ±100 | nA    |
| <b>On Characteristics</b>                                     |   |  |      |      |      |       |
| V <sub>GS(th)</sub>   | Gate Threshold Voltage                                    | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA   | 1.0  | 1.5  | 2.2  | V     |
| R <sub>DS(on)</sub>   | Static Drain-Source on-Resistance<br><small>note3</small> | V <sub>GS</sub> =10V, I <sub>D</sub> =4A   | -    | 26   | 40   | mΩ    |
|   |   | V <sub>GS</sub> =4.5V, I <sub>D</sub> =3A  | -    | 35   | 60   |       |
| <b>Dynamic Characteristics</b>                                |   |  |      |      |      |       |
| C <sub>iss</sub>  | Input Capacitance   | V <sub>DS</sub> =20V, V <sub>GS</sub> =0V,<br>f=1.0MHz   | -    | 435  | -    | pF    |
| C <sub>oss</sub>  | Output Capacitance  |  | -    | 58   | -    | pF    |
| C <sub>rss</sub>  | Reverse Transfer Capacitance                              |  | -    | 35   | -    | pF    |
| Q <sub>g</sub>  | Total Gate Charge   | V <sub>DS</sub> =20V, I <sub>D</sub> =3A,<br>V <sub>GS</sub> =10V  | -    | 11   | -    | nC    |
| Q <sub>gs</sub>   | Gate-Source Charge  |  | -    | 2    | -    | nC    |
| Q <sub>gd</sub>   | Gate-Drain("Miller") Charge                               |  | -    | 2.5  | -    | nC    |
| <b>Switching Characteristics</b>                              |   |  |      |      |      |       |
| t <sub>d(on)</sub>  | Turn-on Delay Time  | V <sub>DD</sub> =20V, I <sub>D</sub> =4A,<br>R <sub>L</sub> =1Ω, R <sub>GEN</sub> =3Ω,<br>V <sub>GS</sub> =10V | -    | 10   | -    | ns    |
| t <sub>r</sub>  | Turn-on Rise Time   |  | -    | 8    | -    | ns    |
| t <sub>d(off)</sub>   | Turn-off Delay Time                                       |  | -    | 29   | -    | ns    |
| t <sub>f</sub>  | Turn-off Fall Time  |  | -    | 12   | -    | ns    |
| <b>Drain-Source Diode Characteristics and Maximum Ratings</b> |   |  |      |      |      |       |
| I <sub>S</sub>  | Maximum Continuous Drain to Source Diode Forward Current  |  | -    | -    | 7.2  | A     |
| I <sub>SM</sub>   | Maximum Pulsed Drain to Source Diode Forward Current      |  | -    | -    | 20   | A     |
| V <sub>SD</sub>   | Drain to Source Diode Forward Voltage                     | V <sub>GS</sub> =0V, I <sub>S</sub> =5A  | -    | -    | 1.2  | V     |
| t <sub>rr</sub>   | Body Diode Reverse Recovery Time                          | T <sub>J</sub> =25°C,<br>I <sub>F</sub> =5A, dI/dt=100A/μs   | -    | 20   | -    | ns    |
| Q <sub>rr</sub>   | Body Diode Reverse Recovery Charge                        |  | -    | 11   | -    | nC    |

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

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



#### CST4614C Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

| Parameter                                      | Symbol               | Conditions   | Min. | Typ. | Max. | Units |
|--|----------------------|--|------|------|------|-------|
| <b>Static Characteristics</b>                  |                      |  |      |      |      |       |
| Drain-Source Breakdown Voltage                 | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA  | -40  | -    | -    | V     |
| Zero Gate Voltage Drain Current                | I <sub>DSS</sub>     | V <sub>DS</sub> = -40V, V <sub>GS</sub> = 0V   | -    | -    | -1   | μA    |
| Gate-Body Leakage                              | I <sub>GSS</sub>     | V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V   | -    | -    | ±100 | nA    |
| Gate-Threshold Voltage                         | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA                                  | -1.2 | -1.5 | -2.5 | V     |
| Drain-Source on-Resistance <sup>3</sup>        | R <sub>DS(on)</sub>  | V <sub>GS</sub> = -10V, I <sub>D</sub> = -5A   | -    | 62   | 85   | mΩ    |
|  |                      | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -4A  | -    | 80   | 125  |       |
| <b>Dynamic Characteristics<sup>4</sup></b>     |                      |  |      |      |      |       |
| Input Capacitance                              | C <sub>iss</sub>     | V <sub>GS</sub> = 0V, V <sub>DS</sub> = -20V,<br>f=1.0MHz                                    | -    | 553  | -    | pF    |
| Output Capacitance                             | C <sub>oss</sub>     |  | -    | 50   | -    |       |
| Reverse Transfer Capacitance                   | C <sub>rss</sub>     |  | -    | 42   | -    |       |
| <b>Switching Characteristics<sup>4</sup></b>   |                      |  |      |      |      |       |
| Total Gate Charge                              | Q <sub>g</sub>       | V <sub>GS</sub> = -10V, V <sub>DS</sub> = -20V,<br>I <sub>D</sub> = -5A                      | -    | 11.8 | -    | nC    |
| Gate-Source Charge                             | Q <sub>gs</sub>      |  | -    | 2.2  | -    |       |
| Gate-Drain Charge                              | Q <sub>gd</sub>      |  | -    | 3    | -    |       |
| Turn-on Delay Time                             | t <sub>d(on)</sub>   | V <sub>DS</sub> = -20V, V <sub>GS</sub> = -10V<br>R <sub>L</sub> = 2.5Ω, R <sub>G</sub> = 3Ω | -    | 7    | -    | ns    |
| Rise Time                                      | t <sub>r</sub>       |  | -    | 6.5  | -    |       |
| Turn-off Delay Time                            | t <sub>d(off)</sub>  |  | -    | 24   | -    |       |
| Fall Time                                      | t <sub>f</sub>       |  | -    | 7.8  | -    |       |
| <b>Drain-Source Body Diode Characteristics</b> |                      |  |      |      |      |       |
| Body Diode voltage <sup>3</sup>                | V <sub>DS</sub>      | I <sub>S</sub> = -5A, V <sub>GS</sub> =0V  | -    | -    | -1.2 | V     |
| Continuous Source Current                      | I <sub>S</sub>       |  | -    | -    | -5.5 | A     |

#### Notes:

1. Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=150°C.
2. 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.
3. Pulse Test: Pulse width≤300μs, duty cycle≤2%.
4. This value is guaranteed by design hence it is not included in the production test.



## CST4614C Typical Performance Characteristics-N

Figure 1: Output Characteristics

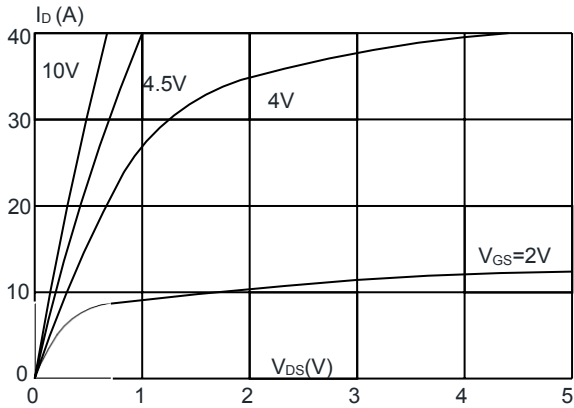


Figure 2: Typical Transfer Characteristics

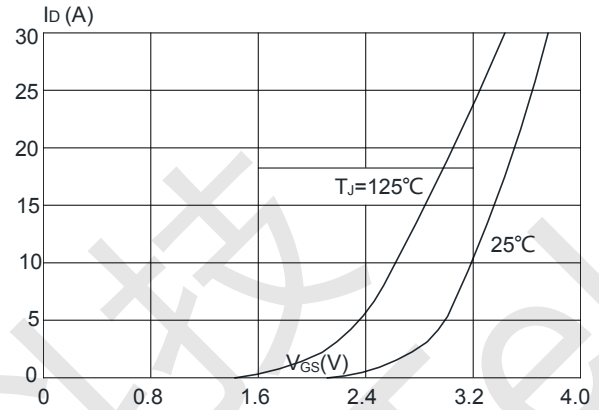


Figure 3: On-resistance vs. Drain Current

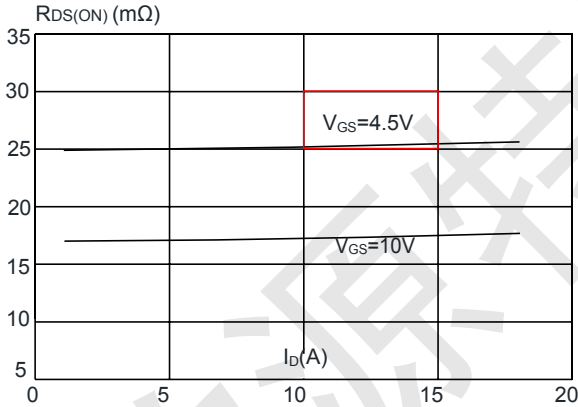


Figure 4: Body Diode Characteristics

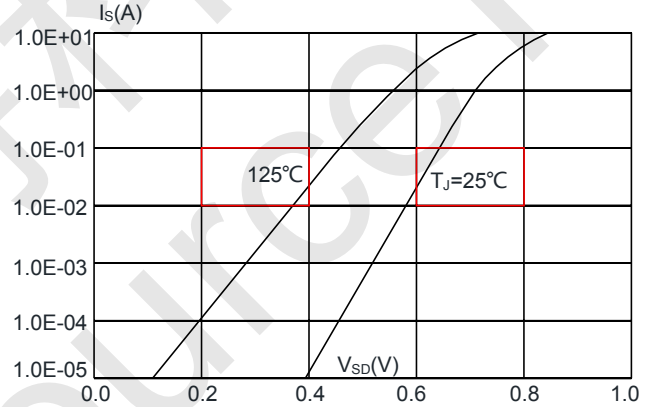


Figure 5: Gate Charge Characteristics

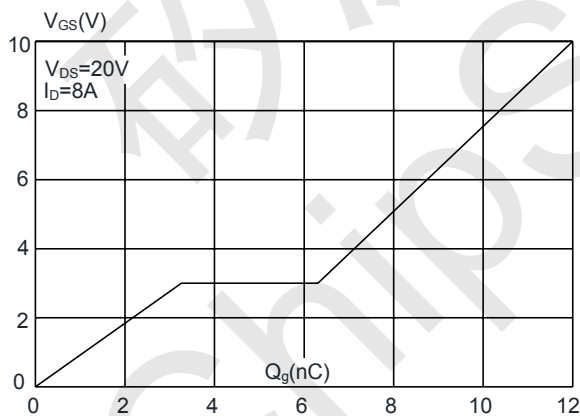
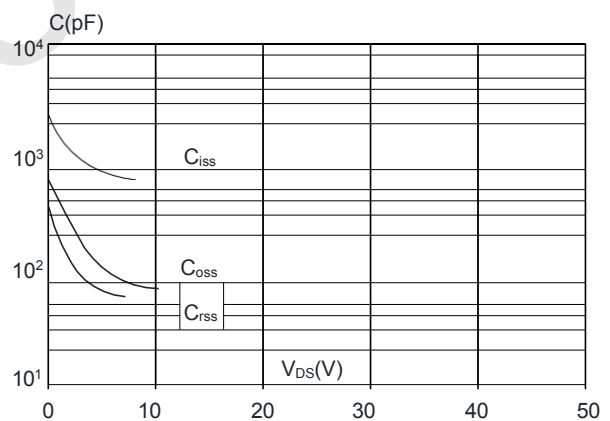


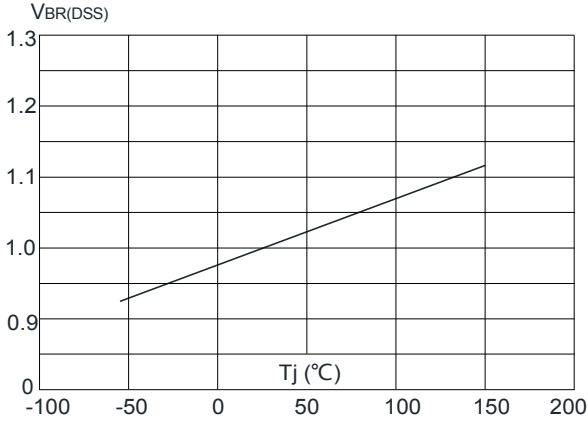
Figure 6: Capacitance Characteristics



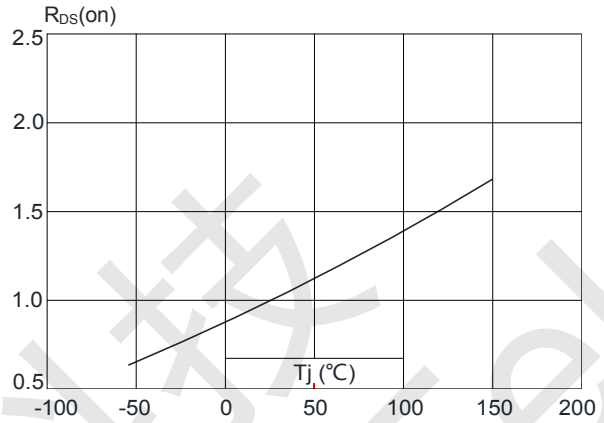


### CST4614C N-Ch and P-Ch Fast Switching MOSFETs

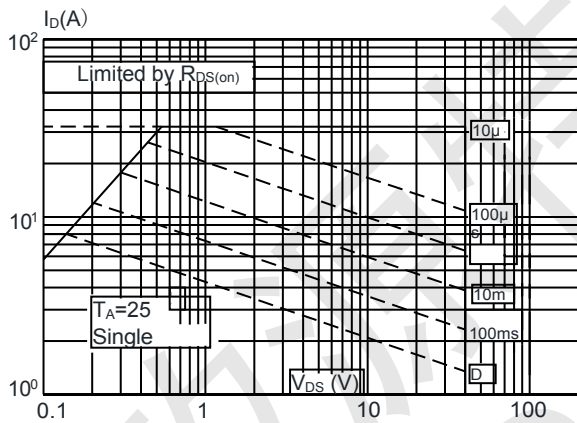
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



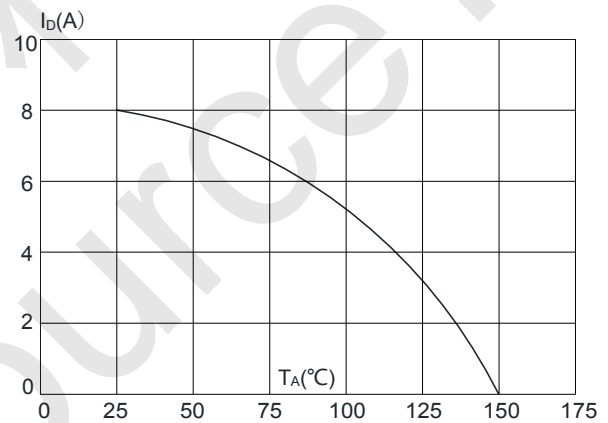
**Figure 8:** Normalized on Resistance vs. Junction Temperature



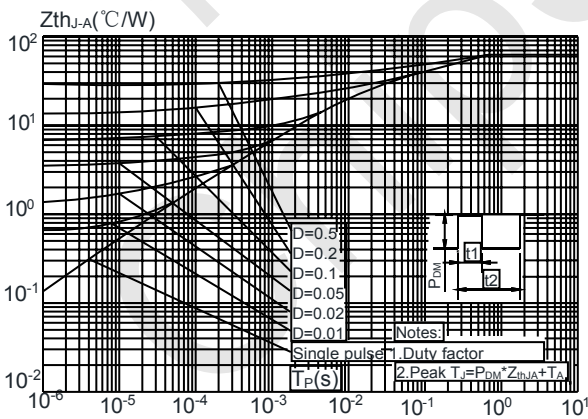
**Figure 9:** Maximum Safe Operating Area



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



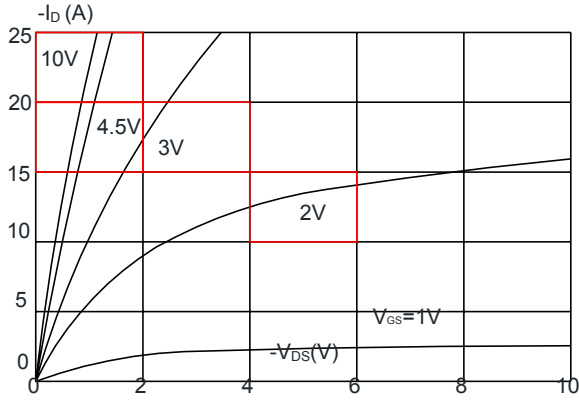
**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



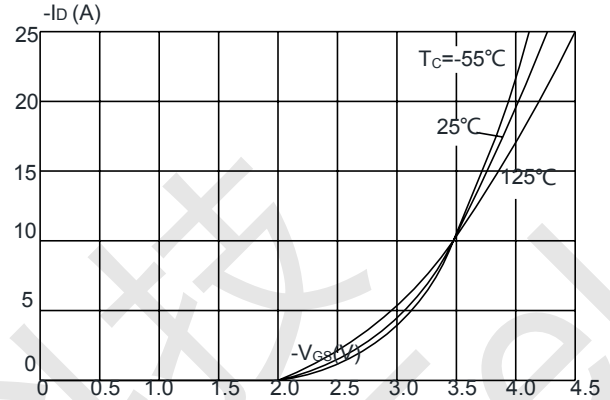


## CST4614C Typical Performance Characteristics-P

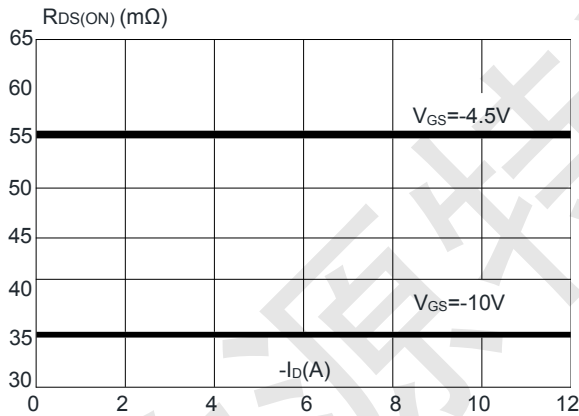
**Figure 1: Output Characteristics**



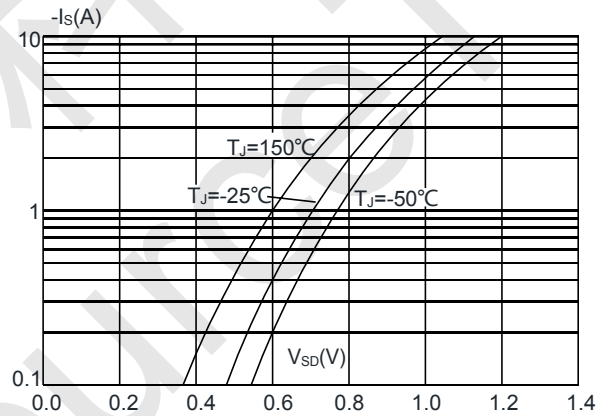
**Figure 2: Typical Transfer Characteristics**



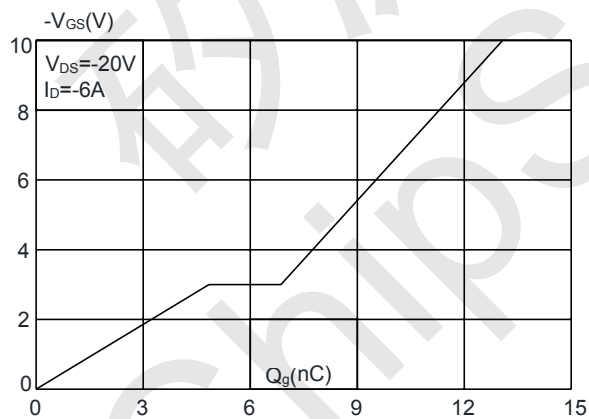
**Figure 3: On-resistance vs. Drain Current**



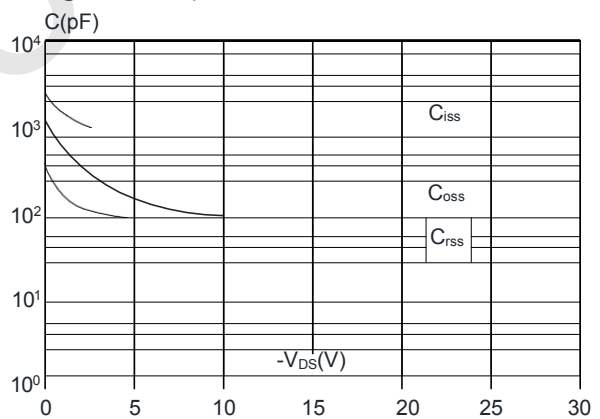
**Figure 4: Body Diode Characteristics**



**Figure 5: Gate Charge Characteristics**



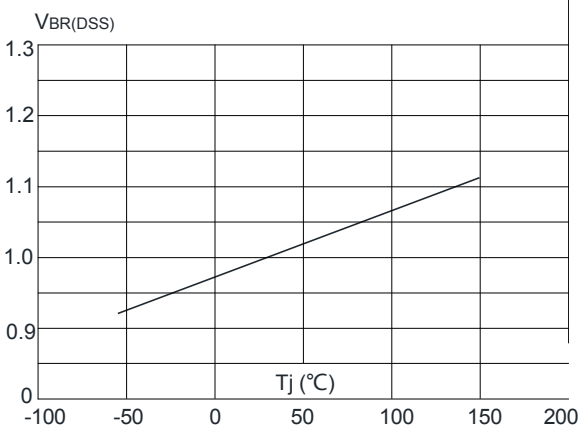
**Figure 6: Capacitance Characteristics**



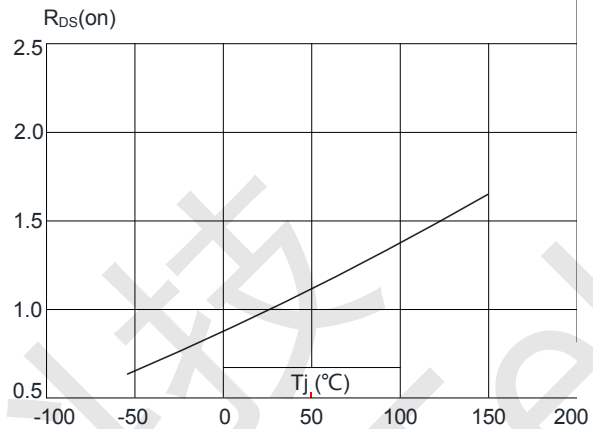


### CST4614C N-Ch and P-Ch Fast Switching MOSFETs

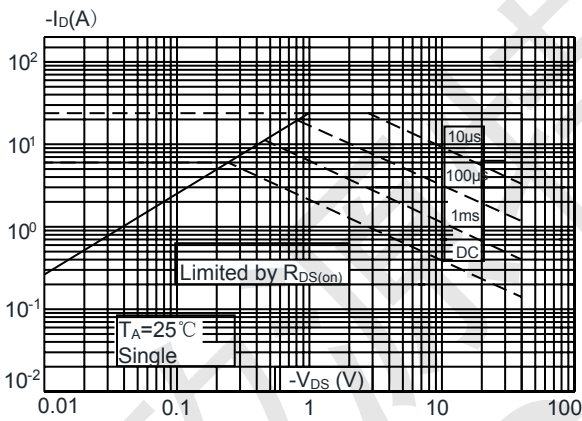
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



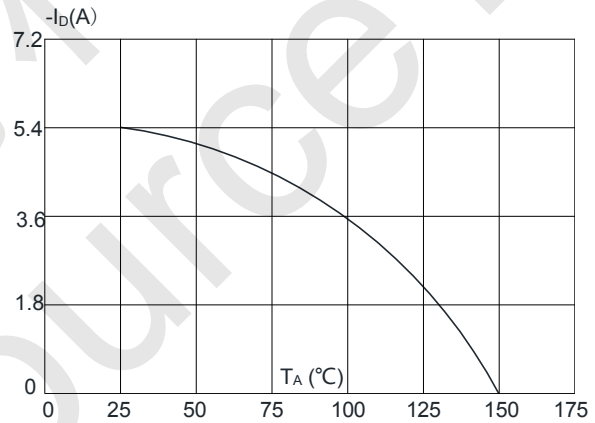
**Figure 8:** Normalized on Resistance vs. Junction Temperature



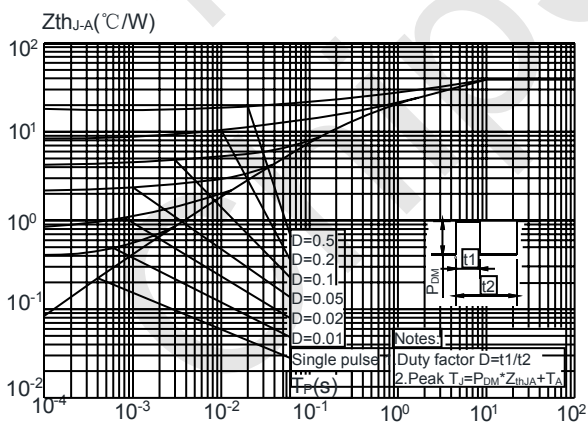
**Figure 9:** Maximum Safe Operating Area



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

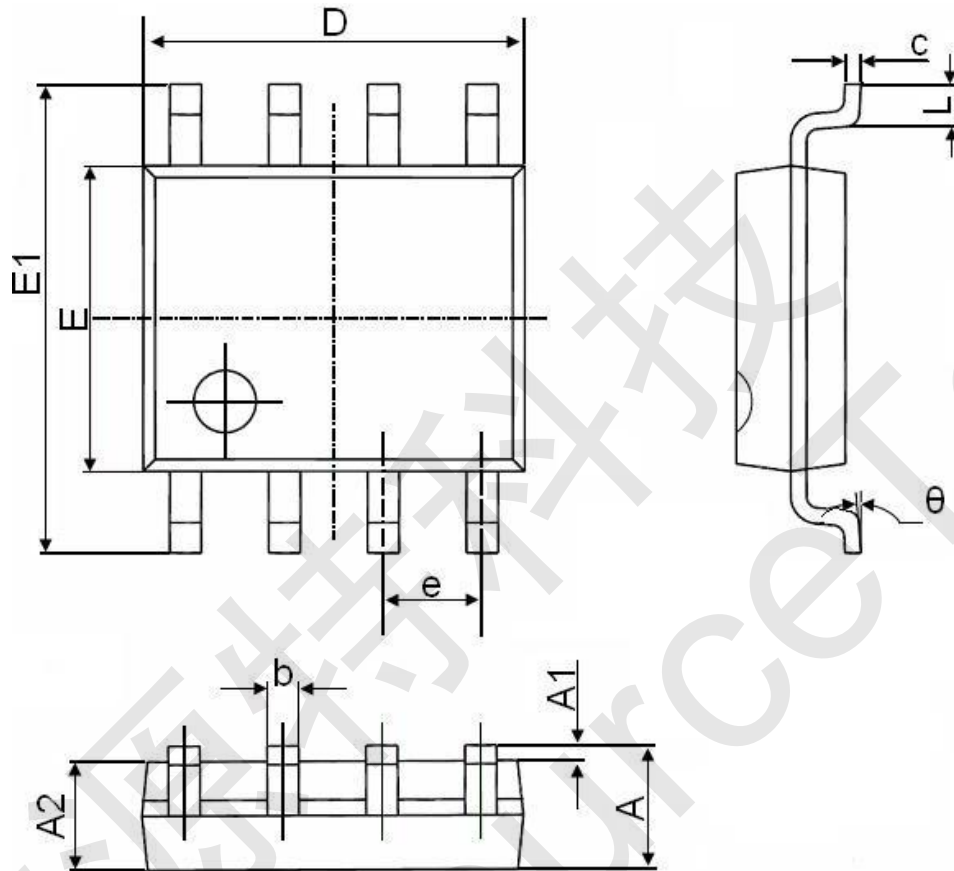


**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient





CST4614C SOP-8 Package Information



| Symbol   | Dimensions In Millimeters |       | Dimensions In Inches |       |
|----------|---------------------------|-------|----------------------|-------|
|          | Min.                      | Max.  | Min.                 | Max.  |
| A        | 1.350                     | 1.750 | 0.053                | 0.069 |
| A1       | 0.100                     | 0.250 | 0.004                | 0.010 |
| A2       | 1.350                     | 1.550 | 0.053                | 0.061 |
| b        | 0.330                     | 0.510 | 0.013                | 0.020 |
| c        | 0.170                     | 0.250 | 0.006                | 0.010 |
| D        | 4.700                     | 5.100 | 0.185                | 0.200 |
| E        | 3.800                     | 4.000 | 0.150                | 0.157 |
| E1       | 5.800                     | 6.200 | 0.228                | 0.244 |
| e        | 1.270(BSC)                |       | 0.050(BSC)           |       |
| L        | 0.400                     | 1.270 | 0.016                | 0.050 |
| $\theta$ | 0°                        | 8°    | 0°                   | 8°    |