## 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

### Product Summary

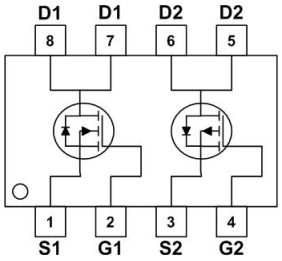
Green

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

### Description

The XR4614C 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 XR4614C meet the RoHS and Green

### SOP8 Pin Configurations


### Absolute Maximum Ratings

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

## 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 | 40 | - | - | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ =40V, $V_{GS}$=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 | 2.2 | V |
| $R_{DS(on)}$ | Static Drain-Source on-Resistance note3 | $V_{GS}$=10V, $I_D$=4A | - | 26 | 40 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=3A | - | 35 | 60 | |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=20V, $V_{GS}$=0V, f=1.0MHz | - | 435 | - | pF |
| $C_{oss}$ | Output Capacitance | | - | 58 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 35 | - | pF |
| $Q_g$ | Total Gate Charge | $V_{DS}$=20V, $I_D$=3A, $V_{GS}$=10V | - | 11 | - | nC |
| $Q_{gs}$ | Gate-Source Charge | | - | 2 | - | nC |
| $Q_{gd}$ | Gate-Drain(“Miller”) Charge | | - | 2.5 | - | nC |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DD}$=20V, $I_D$=4A, $R_L$=1Ω, $R_{GEN}$=3Ω, $V_{GS}$=10V | - | 10 | - | ns |
| $t_r$ | Turn-on Rise Time | | - | 8 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | | - | 29 | - | ns |
| $t_f$ | Turn-off Fall Time | | - | 12 | - | ns |
| **Drain-Source Diode Characteristics and Maximum Ratings** | | | | | | |
| $I_S$ | Maximum Continuous Drain to Source Diode Forward Current | | - | - | 7.2 | A |
| $I_{SM}$ | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | 20 | A |
| $V_{SD}$ | Drain to Source Diode Forward Voltage | $V_{GS}$=0V, $I_S$=5A | - | - | 1.2 | V |
| $t_{rr}$ | Body Diode Reverse Recovery Time | $T_J$=25℃, $I_F$=5A,dI/dt=100A/μs | - | 20 | - | ns |
| $Q_{rr}$ | 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%

## Electrical Characteristics ($T_J$=25°C unless otherwise noted)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$= 0V, $I_D$= -250μA | -40 | - | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$= -40V, $V_{GS}$= 0V | - | - | -1 | μA |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$= 0V, $V_{GS}$= ±20V | - | - | ±100 | nA |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$= $V_{GS}$, $I_D$= -250μA | -1.2 | -1.5 | -2.5 | V |
| Drain-Source on-Resistance[3] | $R_{DS(on)}$ | $V_{GS}$= -10V,$I_D$= -5A | - | 62 | 85 | mΩ |
| | | $V_{GS}$= -4.5V,$I_D$= -4A | - | 80 | 125 | |
| **Dynamic Characteristics**[4] | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$ = 0V ,$V_{DS}$ = -20V, f=1.0MHz | - | 553 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 50 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 42 | - | |
| **Switching Characteristics**[4] | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{GS}$= -10V ,$V_{DS}$= -20V, $I_D$= -5A | - | 11.8 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 2.2 | - | |
| Gate-Drain Charge | $Q_{gd}$ | | - | 3 | - | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DS}$= -20V, $V_{GS}$= -10V $R_L$= 2.5Ω, $R_G$= 3Ω | - | 7 | - | ns |
| Rise Time | $t_r$ | | - | 6.5 | - | |
| Turn-off Delay Time | $t_{d(off)}$ | | - | 24 | - | |
| Fall Time | $t_f$ | | - | 7.8 | - | |
| **Drain-Source Body Diode Characteristics** | | | | | | |
| Body Diode voltage[3] | $V_{DS}$ | $I_S$= -5A,$V_{GS}$=0V | - | - | -1.2 | V |
| Continuous Source Current | $I_S$ | | - | - | -5.5 | A |

**Notes:**

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=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.

## Typical Performance Characteristics-N

**Figure1:** Output Characteristics

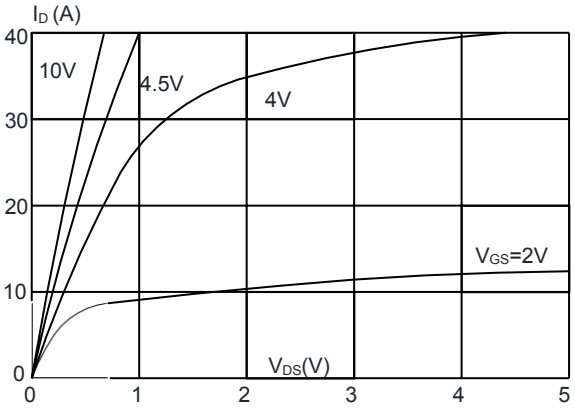



**Figure 2:** Typical Transfer Characteristics

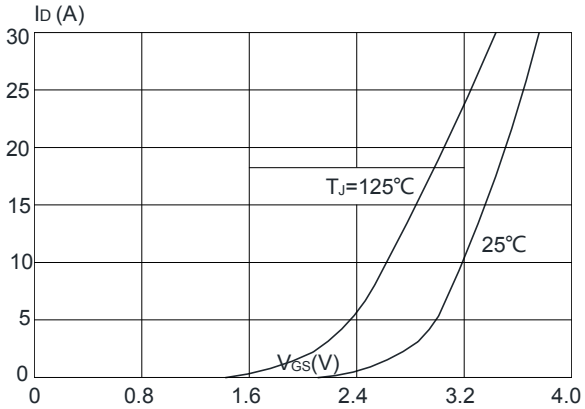



**Figure 3:**On-resistance vs. Drain Current

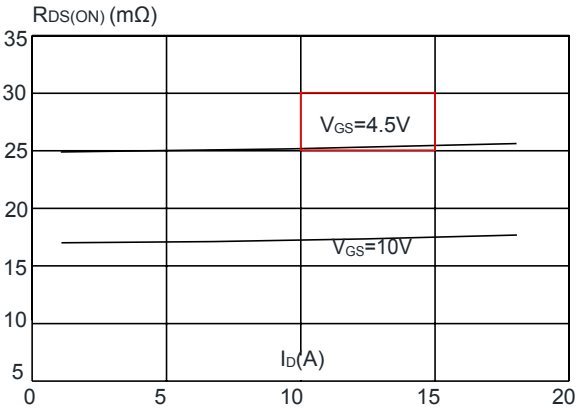



**Figure 4**: Body Diode Characteristics

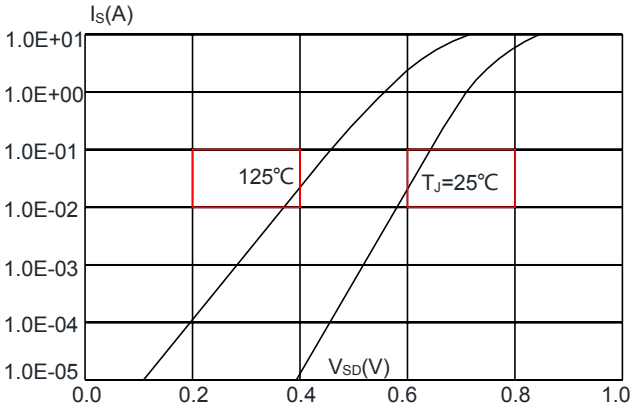



**Figure 5:** Gate Charge Characteristics

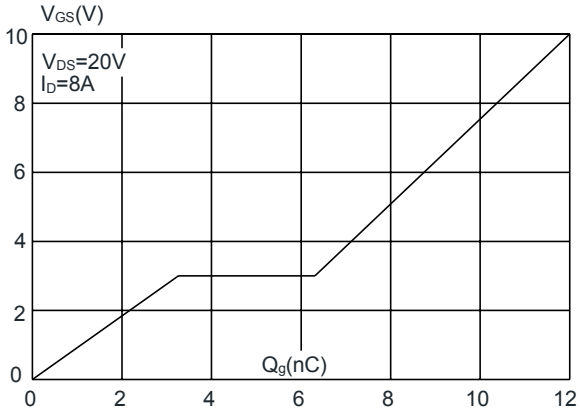



**Figure 6:** Capacitance Characteristics

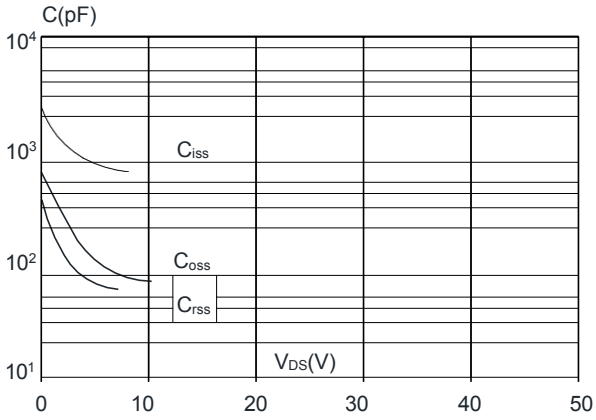


**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature

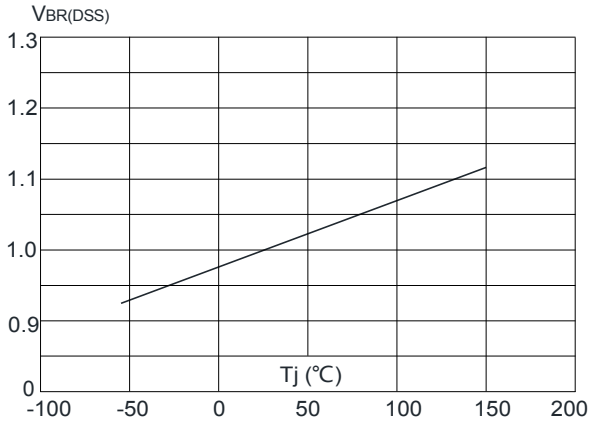



**Figure 8:** Normalized on Resistance vs. Junction Temperature

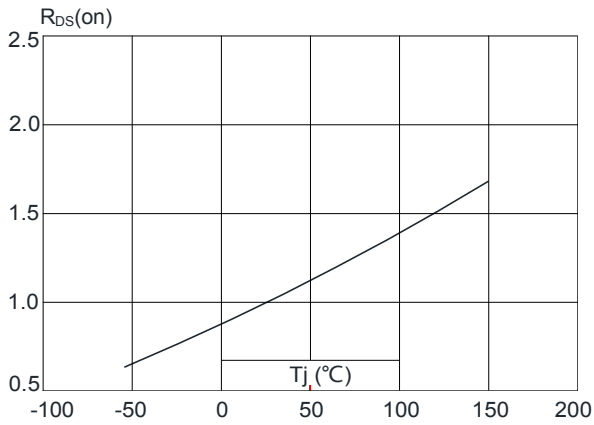



**Figure 9:** Maximum Safe Operating Area

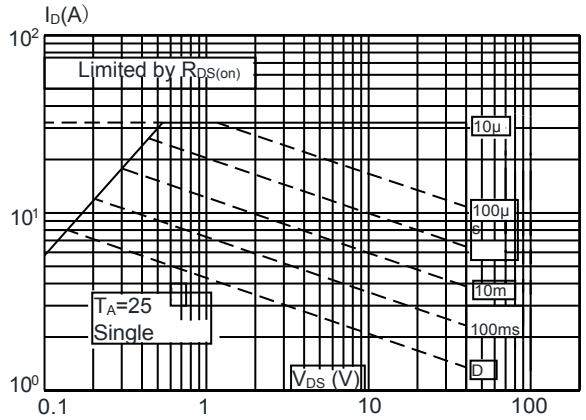



**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature

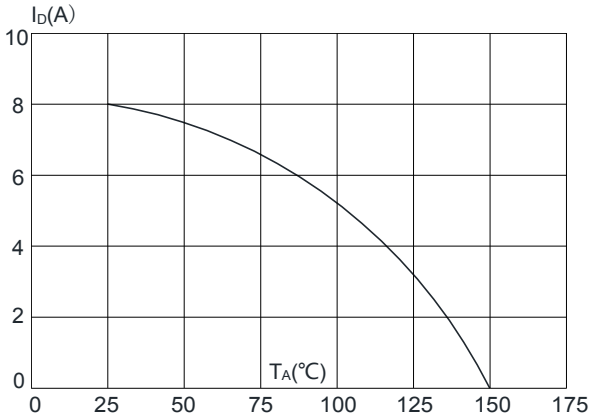
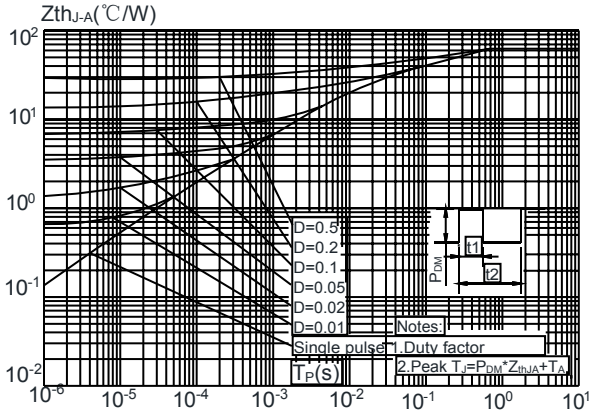



**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



## Typical Performance Characteristics-P

**Figure1:** Output Characteristics

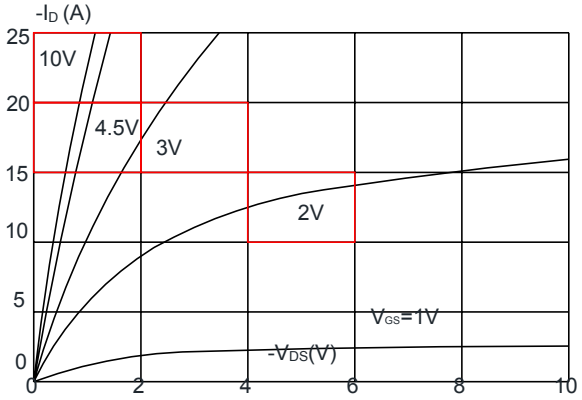
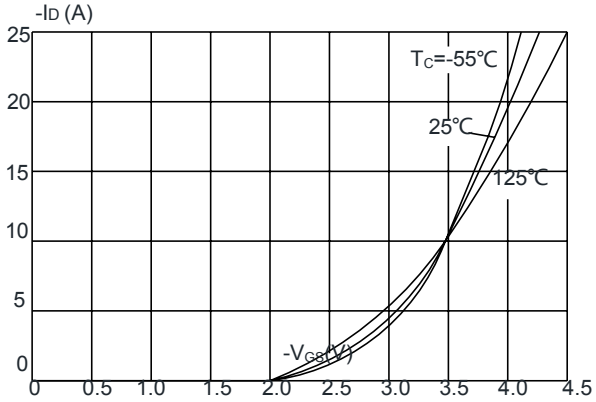



**Figure 2:** Typical Transfer Characteristics

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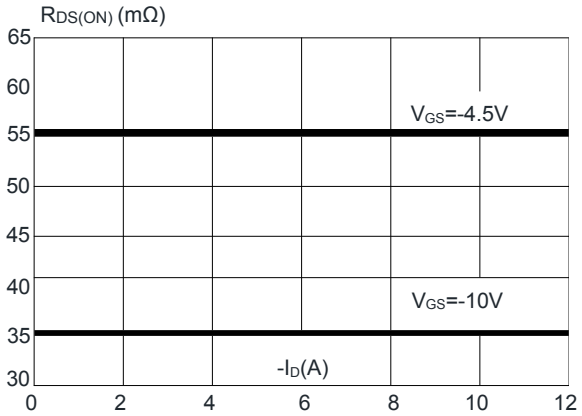



**Figure 4**: Body Diode Characteristics

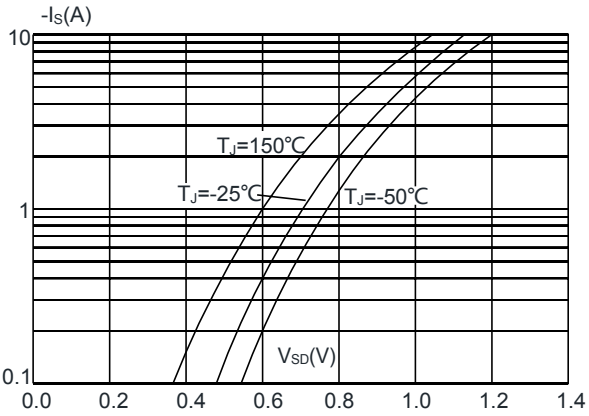



**Figure 5:** Gate Charge Characteristics

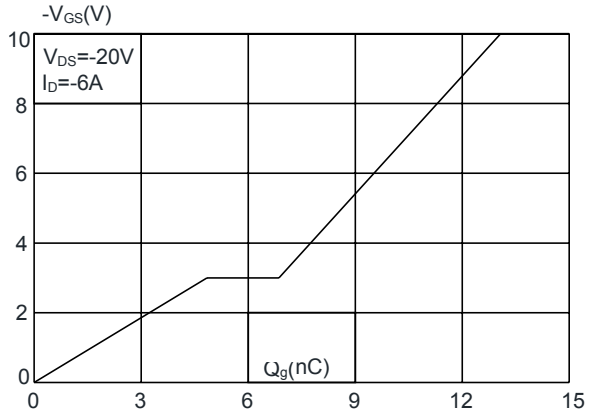



**Figure 6:** Capacitance Characteristics

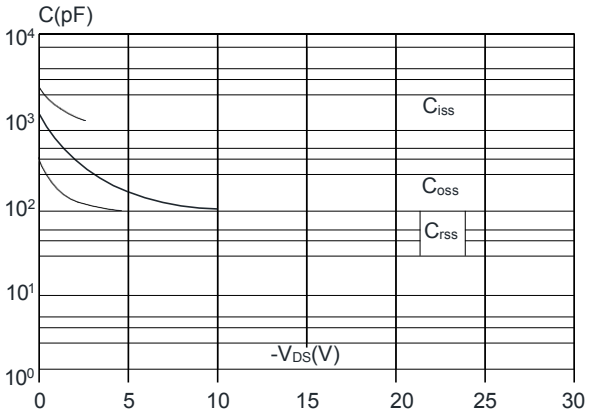


**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature

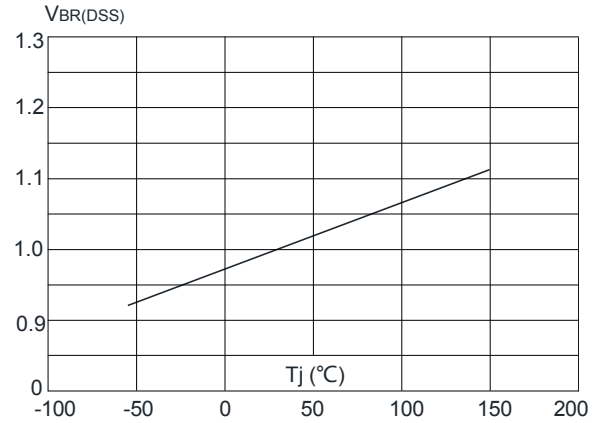
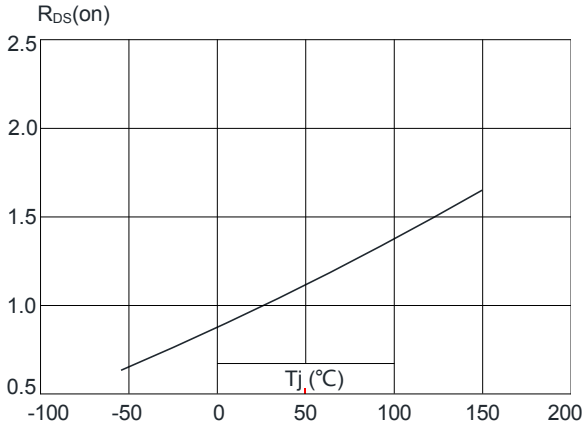



**Figure 8:** Normalized on Resistance vs. Junction Temperature

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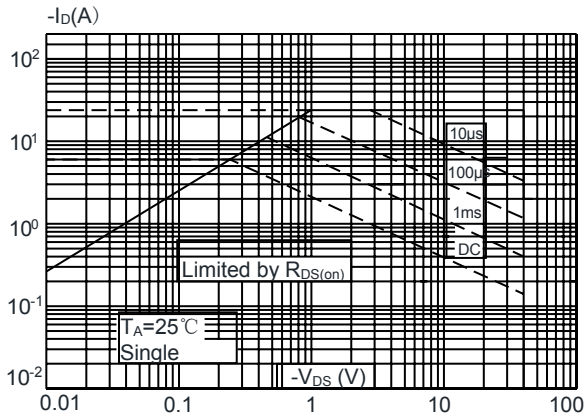


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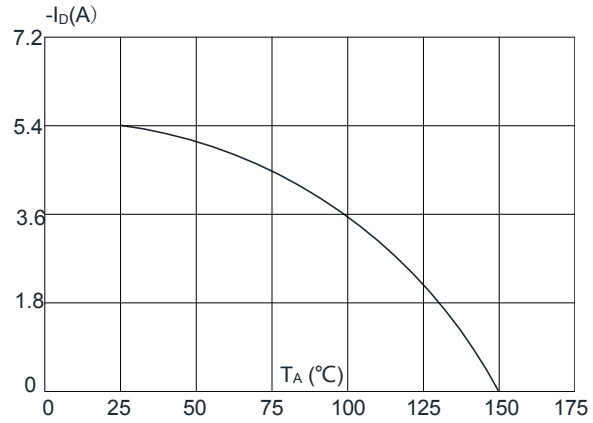
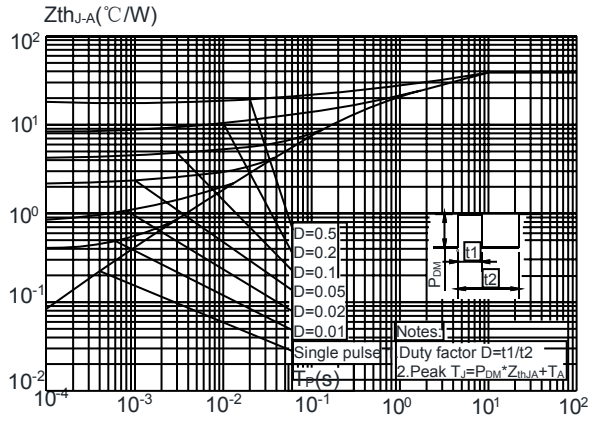
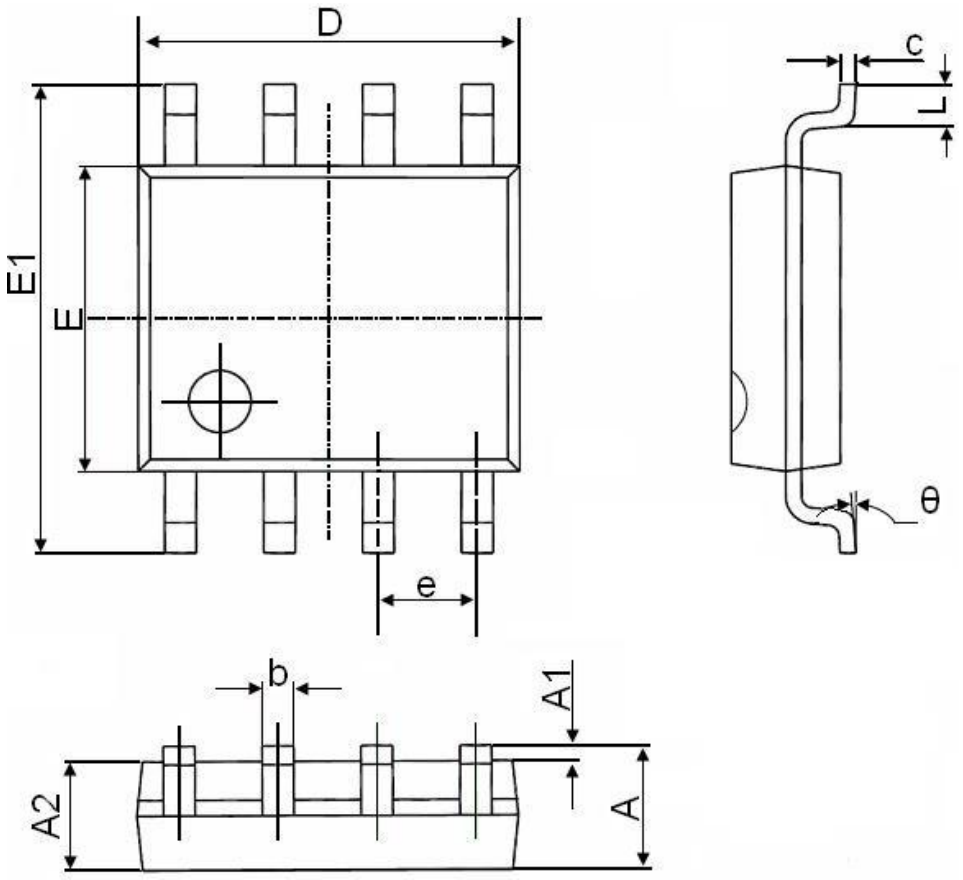



**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



## 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 |
| θ | 0° | 8° | 0° | 8° |