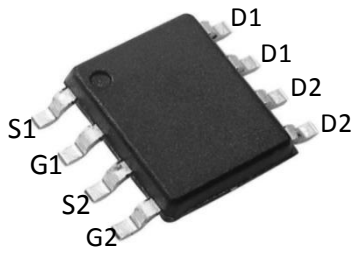
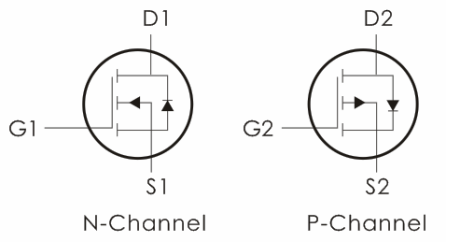
## Description：

This N+P Channel MOSFET uses advanced trench technology and design to provide excellent $R_{DS(on)}$ with low gate charge.

It can be used in a wide variety of applications.




## Features：

N-Channel:$V_{DS}$=30V,$I_D$=10A,$R_{DS(ON)}$<15mΩ @$V_{GS}$=10V（Typ：12mΩ）

P-Channel: $V_{DS}$=-30V,$I_D$=-14A,$R_{DS(ON)}$<20mΩ @$V_{GS}$=-10V（Typ：15mΩ）

1) Low gate charge.
2) Green device available.
3) Advanced high cell denity trench technology for ultra low $R_{DS(ON)}$.
4) Excellent package for good heat dissipation.
5) MSL3

## Package Marking and Ordering Information：

| Part NO. | Marking | Package | Packing |
|---|---|---|---|
| DOS4616B | S4616B | SOP-8D | 3000 pcs/Reel |

## Absolute Maximum Ratings：($T_A$=25℃ unless otherwise noted)

| Symbol | Parameter | N-Channel | P-Channel | Units |
|---|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 30 | -30 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | ±20 | V |
| $I_D$ | Continuous Drain Current- $T_A$=25℃ [1] | 10 | -14 | A |
| | Continuous Drain Current-$T_A$=100℃ [1] | 7 | -9.8 | |
| $I_{DM}$ | Pulsed Drain Current [2] | 40 | -56 | A |
| $E_{AS}$ | Single pulse avalanche energy [3] | 17 | 24 | mJ |
| $P_D$ | Power Dissipation - $T_A$=25℃ | 2.2 | 3.3 | W |
| $T_J$, $T_{STG}$ | Operating and Storage Junction Temperature Range | -55 to +150 | | ℃ |

## Thermal Characteristics：

| Symbol | Parameter | N-CH | P-CH | Units |
|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance,Junction to Ambient | 57 | 37.9 | ℃/W |

## N-Channel Electrical Characteristics: ($T_A$=25℃ unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain-Sourtce Breakdown Voltage | $V_{GS}$=0V,$I_D$=250μA | 30 | --- | --- | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{GS}$=0V, $V_{DS}$=30V | --- | --- | 1 | μA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±20V, $V_{DS}$=0A | --- | --- | ±100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GS(th)}$ | Gate-Source Threshold Voltage | $V_{GS}$=$V_{DS}$, $I_D$=250μA | 1.2 | 1.5 | 2 | V |
| $R_{DS(ON)}$ | Drain-Source On Resistance[4] | $V_{GS}$=10V,$I_D$=10A | --- | 12 | 15 | mΩ |
| | | $V_{GS}$=4.5V,$I_D$=5A | --- | 15 | 21 | mΩ |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=15V, $V_{GS}$=0V, f=1MHz | --- | 820 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 110 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 92 | --- | |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DS}$=30V, $I_D$=20A, $R_{ENG}$=3Ω ,$V_{GS}$=10V | --- | 5 | --- | ns |
| $t_r$ | Rise Time | | --- | 8 | --- | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | --- | 21 | --- | ns |
| $t_f$ | Fall Time | | --- | 7 | --- | ns |
| $Q_g$ | Total Gate Charge | $V_{GS}$=10V, $V_{DS}$=15V, $I_D$=10A | --- | 15 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 4.7 | --- | nC |
| $Q_{gd}$ | Gate-Drain “Miller” Charge | | --- | 3.6 | --- | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V, $I_{SD}$=10A | --- | --- | 1.2 | V |
| $I_S$ | Continuous Drain Curren | $V_D$=$V_G$=0V | --- | --- | 10 | A |
| $I_{SM}$ | Pulsed Drain Current | | --- | --- | 40 | A |
| Trr | Reverse Recovery Time | $I_F$=20A,$T_J$=25℃ dI/dt=100A/us | --- | 7 | --- | ns |
| Qrr | Reverse Recovery Charge | | --- | 5.9 | --- | nC |

## Notes:

1. Computed continuous current assumes the condition of $T_{j,Max}$ while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. EAS condition : TJ=25℃,VDD=15V,$V_G$=10V,L=0.5mH
4. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

## N-Typical Characteristics: ($T_A$=25℃ unless otherwise noted)

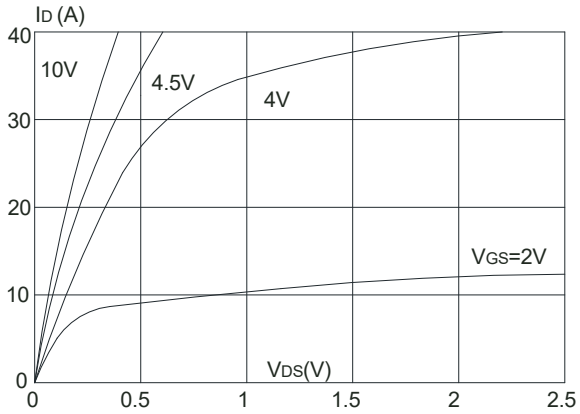



**Figure1:** Output Characteristics

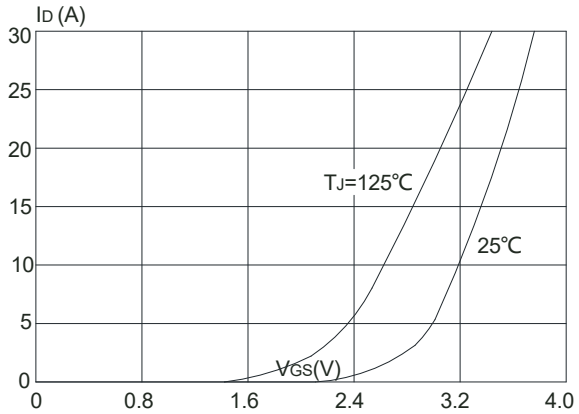



**Figure 2:** Typical Transfer Characteristics

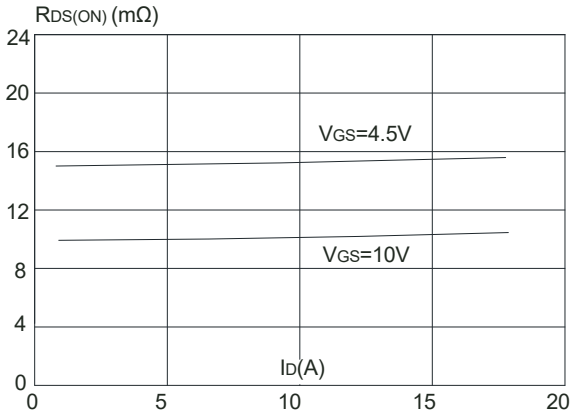



**Figure 3:**On-resistance vs. Drain Current

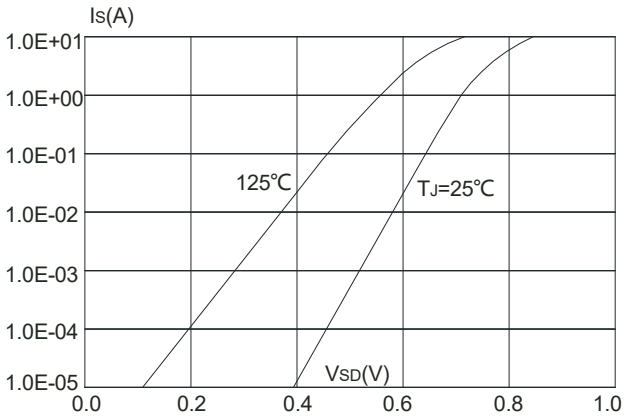



**Figure 4**: Body Diode Characteristics

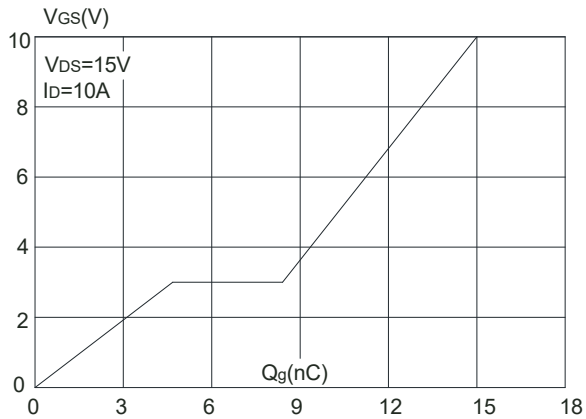



**Figure 5:** Gate Charge Characteristics

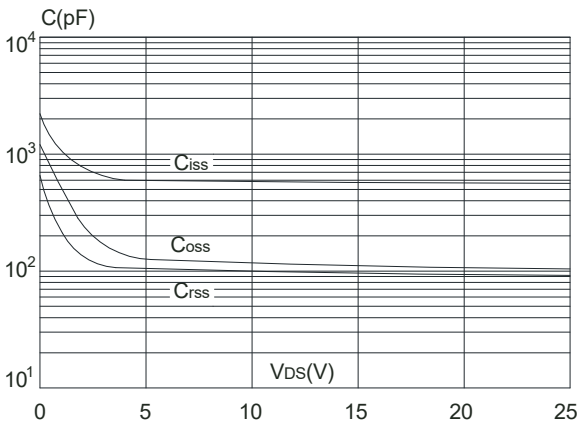



**Figure 6:** Capacitance Characteristics

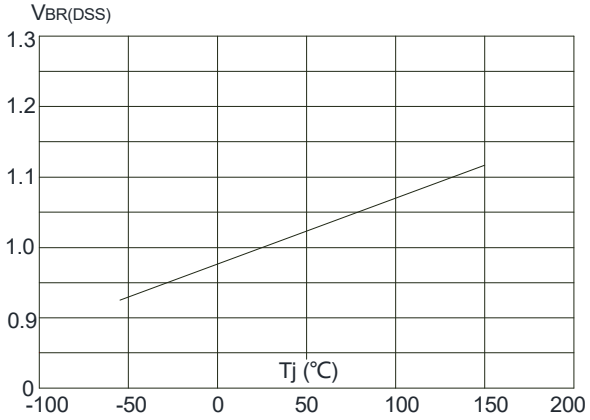



**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature

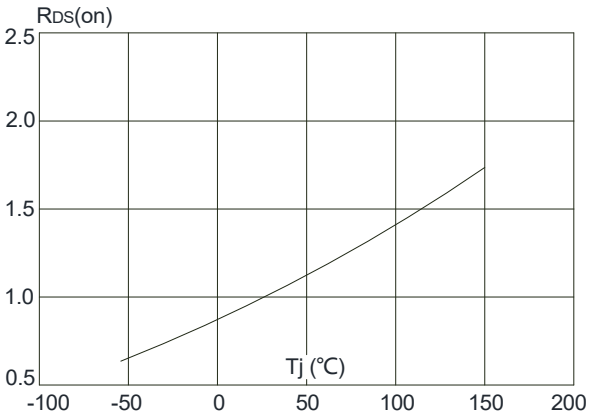



**Figure 8:** Normalized on Resistance vs. Junction Temperature

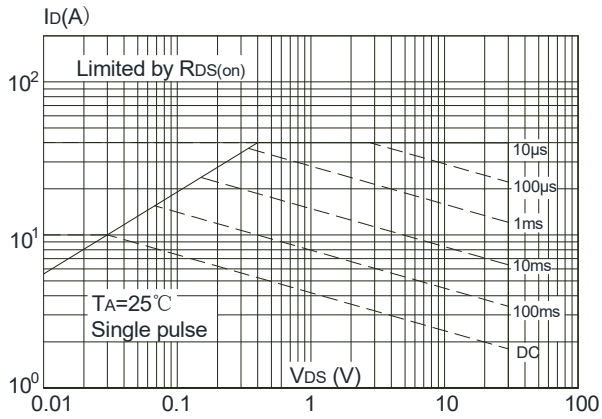



**Figure 9:** Maximum Safe Operating Area

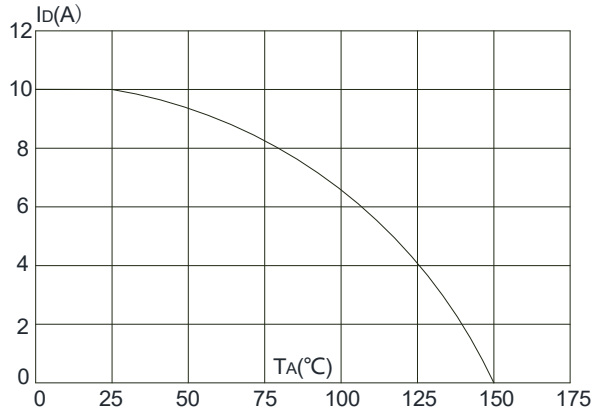



**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature

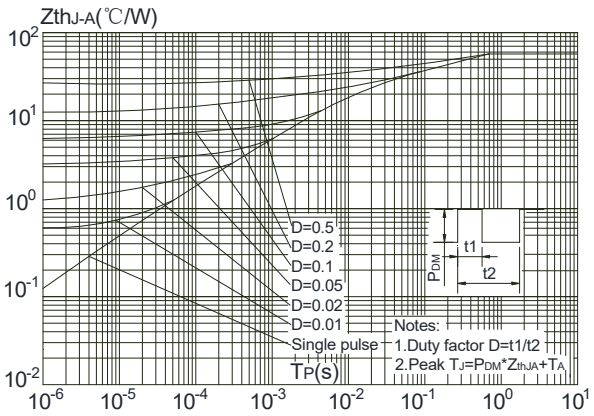



**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

## P-Channel Electrical Characteristics: ($T_A$=25℃ unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain-Sourtce Breakdown Voltage | $V_{GS}$=0V,$I_D$=250μA | -30 | --- | --- | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{GS}$=0V, $V_{DS}$=-30V | --- | --- | -1 | μA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±20V, $V_{DS}$=0A | --- | --- | ±100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GS(th)}$ | Gate-Source Threshold Voltage | $V_{GS}$=$V_{DS}$, $I_D$=250μA | -1 | -1.5 | -2 | V |
| $R_{DS(ON)}$ | Drain-Source On Resistance[4] | $V_{GS}$=-10V,$I_D$=-10A | --- | 15 | 20 | mΩ |
| | | $V_{GS}$=-4.5V,$I_D$=-5A | --- | 15 | 30 | |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=-15V, $V_{GS}$=0V, f=1MHz | --- | 1540 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 325 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 275 | --- | |
| **Switching Characteristics**[4] | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD}$= -15V,$I_D$=-6A<br>$V_{GS}$= -10V, $R_{GEN}$=2.5Ω | --- | 13 | --- | ns |
| $t_r$ | Rise Time | | --- | 18 | --- | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | --- | 93 | --- | ns |
| $t_f$ | Fall Time | | --- | 63 | --- | ns |
| $Q_g$ | Total Gate Charge | $V_{GS}$=-10V,$V_{DS}$=-15V,<br>$I_D$=-9.1A | --- | 28 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 5.2 | --- | nC |
| $Q_{gd}$ | Gate-Drain “Miller” Charge | | --- | 7.5 | --- | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| $I_S$ | Continuous Drain to Source Diode | VD=VG=0V | --- | --- | -14 | A |
| $I_{SM}$ | Pulsed Drain to Source Diode | | --- | --- | -56 | --- |
| $V_{SD}$ | Source-Drain Diode Forward Voltage | $V_{GS}$=0V,$I_S$=-10A | --- | --- | -1.2 | V |

## Notes:

1. Computed continuous current assumes the condition of $T_{j,Max}$ while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. EAS condition : TJ=25℃,VDD=-15V,$V_G$=-10V,L=0.5mH
4. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

## P-Typical Characteristics: ($T_A$=25℃ unless otherwise noted)

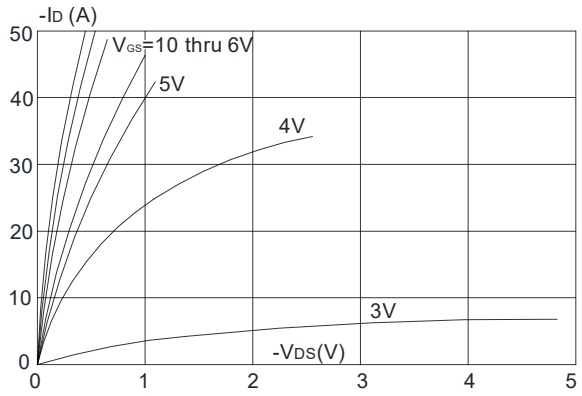



**Figure1:** Output Characteristics

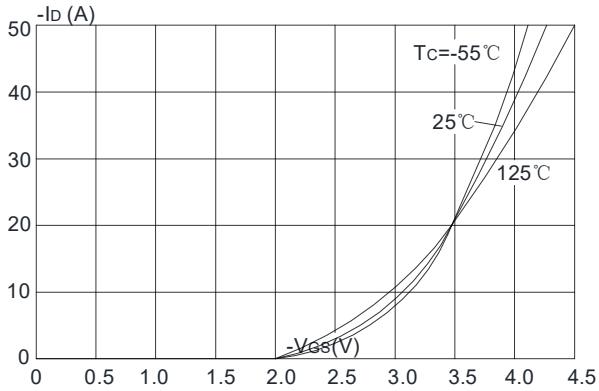



**Figure 2:** Typical Transfer Characteristics

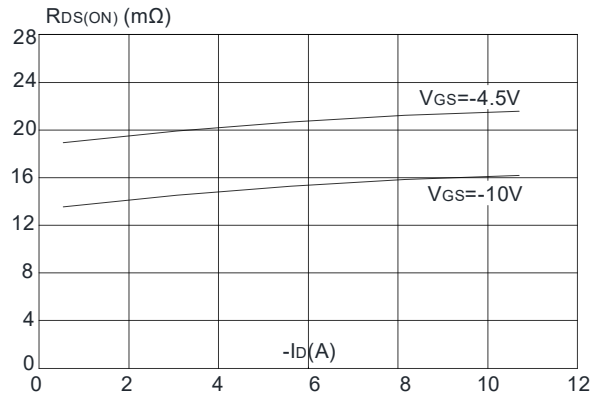



**Figure 3:**On-resistance vs. Drain Current

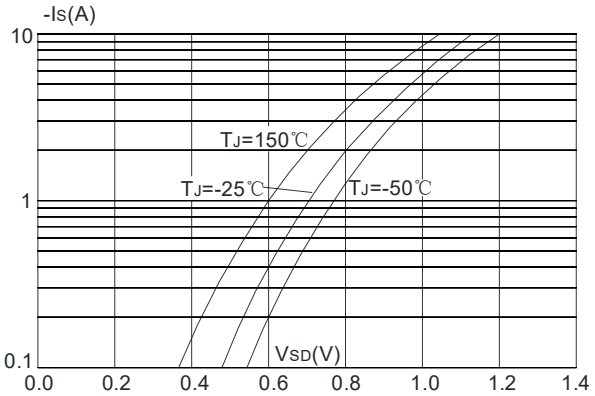



**Figure 4**: Body Diode Characteristics

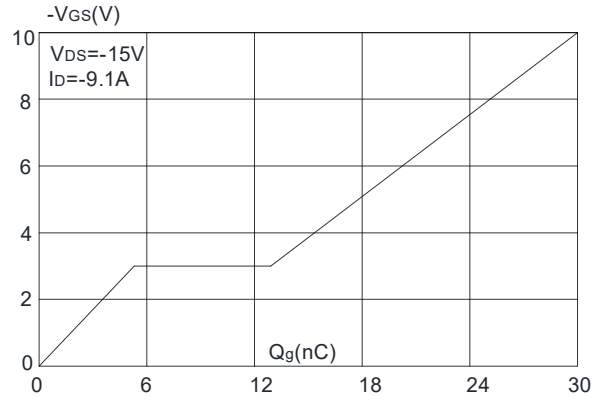



**Figure 5:** Gate Charge Characteristics

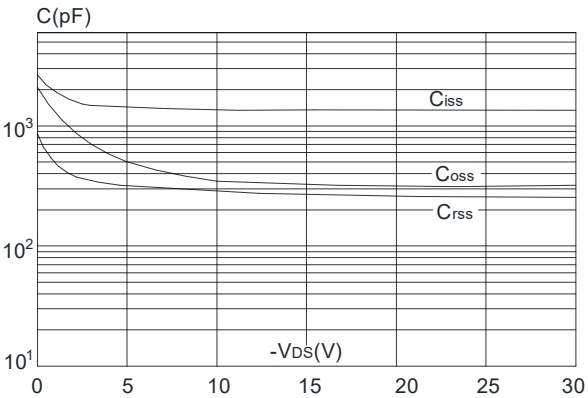



**Figure 6:** Capacitance Characteristics

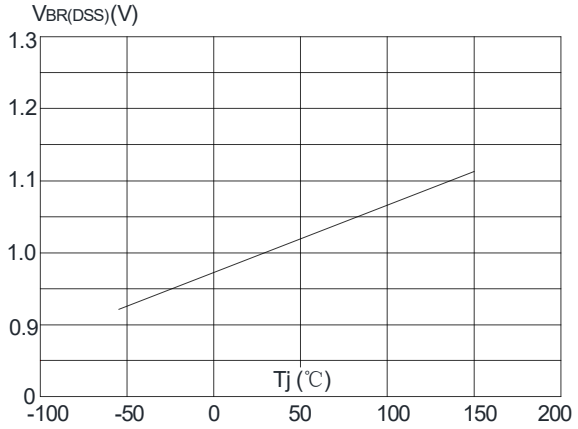



**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature

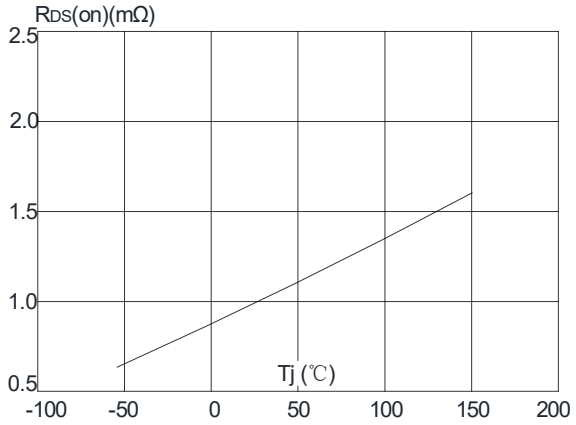



**Figure 8:** Normalized on Resistance vs. Junction Temperature

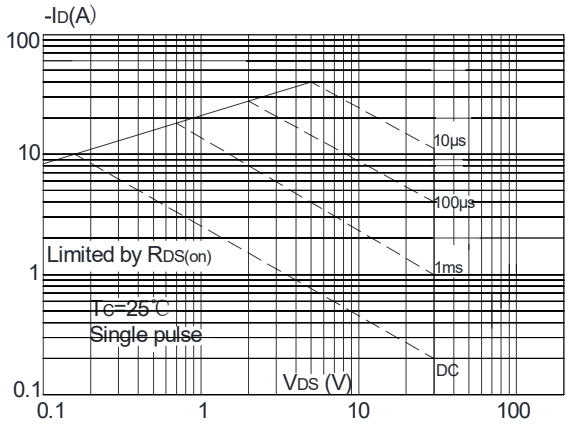



**Figure 9:** Maximum Safe Operating Area

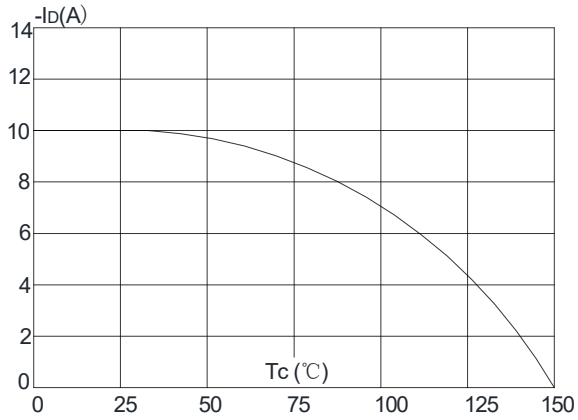



**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature

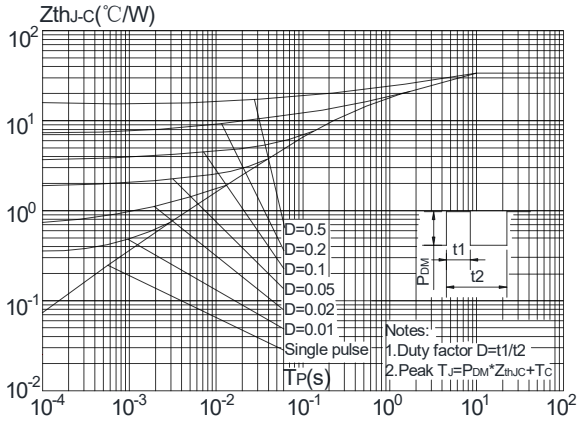
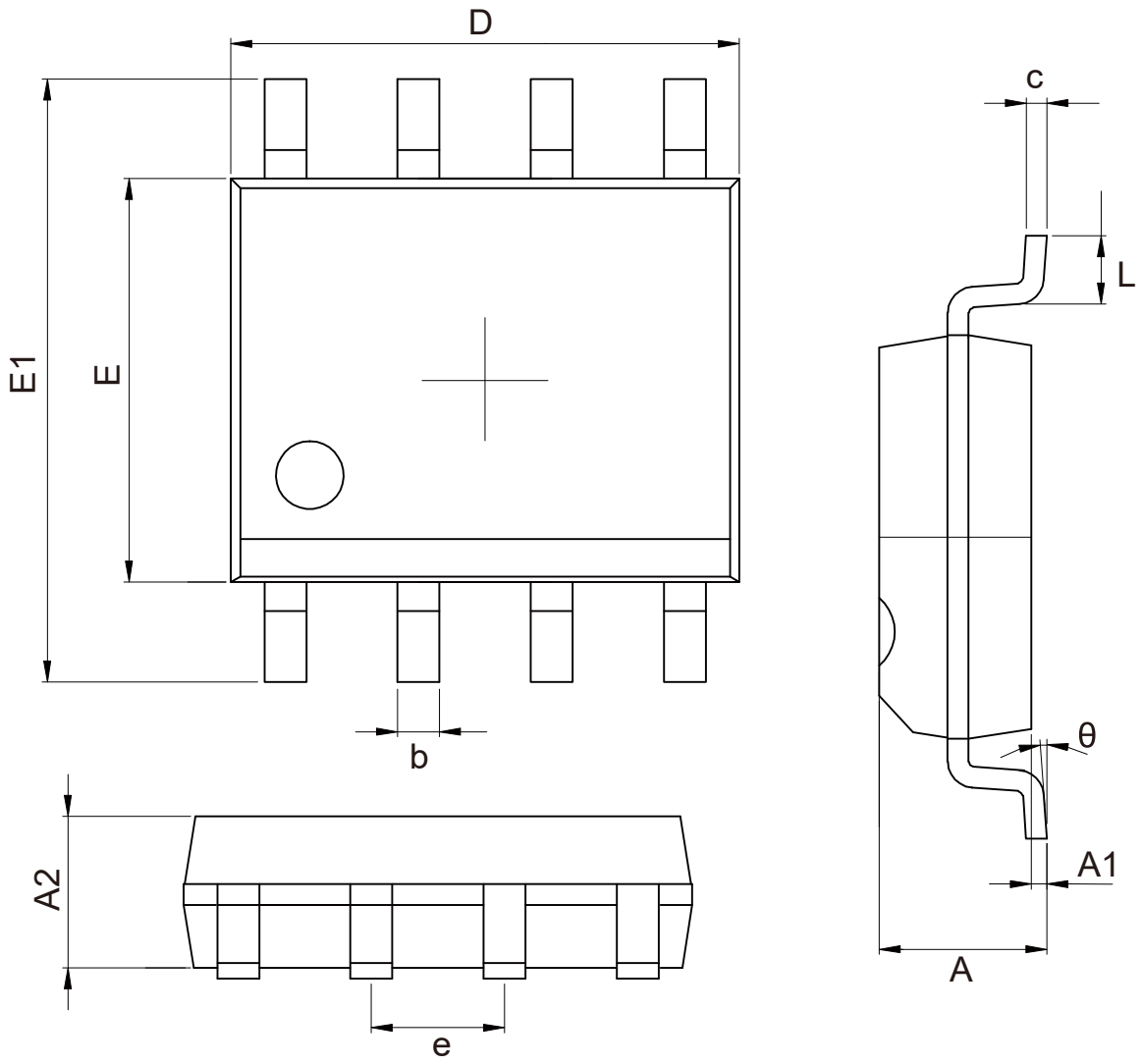



**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

SOP-8D Package Information：

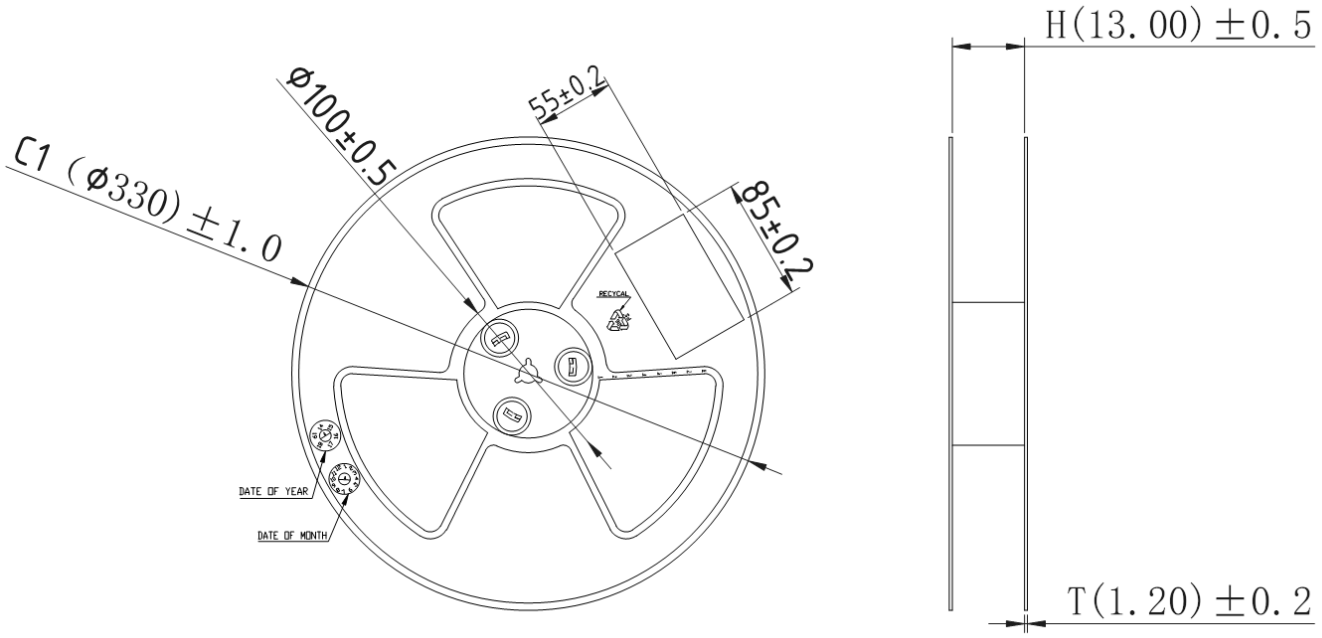


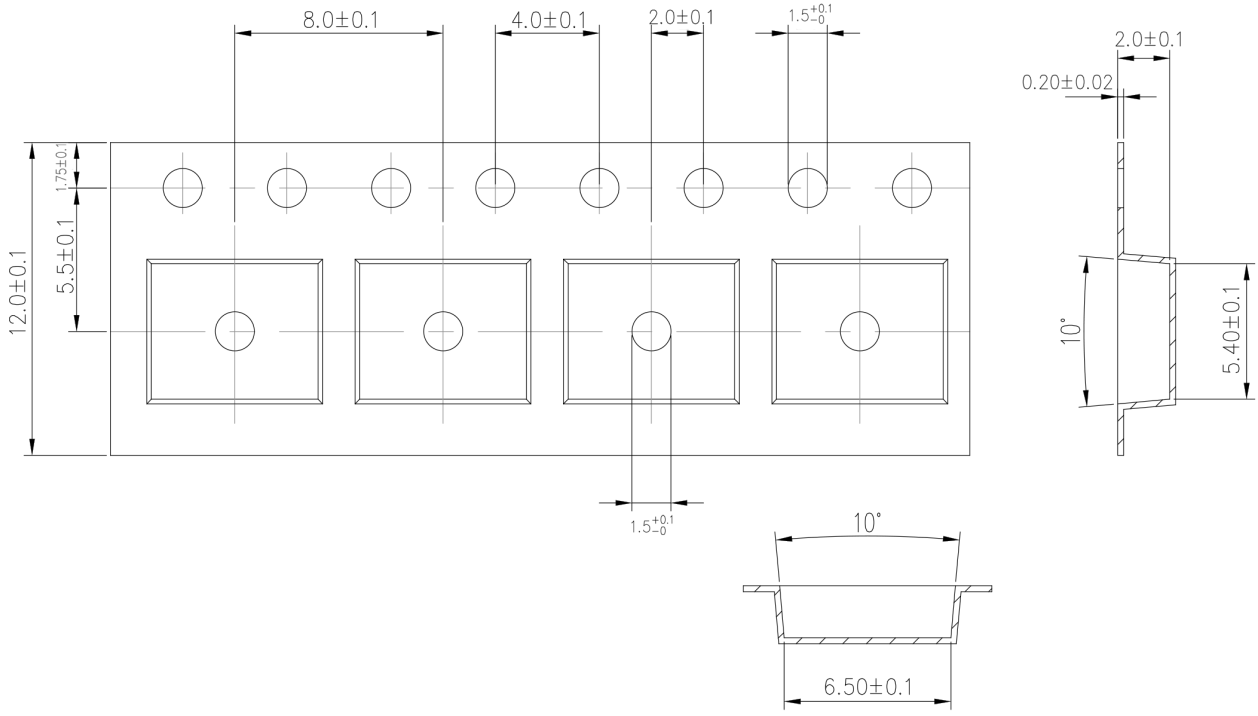

| COMMON DIMENSIONS<br>CUNITS MEASURE=MILLIMETER | | | |
|---|---|---|---|
| SYMBOL | MIN | NOM | MAX |
| A | 1.350 | —— | 1.750 |
| A1 | 0.100 | —— | 0.250 |
| A2 | 1.350 | —— | 1.550 |
| b | 0.330 | —— | 0.510 |
| c | 0.170 | —— | 0.250 |
| D | 4.700 | —— | 5.100 |
| E | 3.800 | 3.900 | 4.000 |
| E1 | 5.800 | —— | 6.200 |
| e | 1.270BSC | | |
| L | 0.400 | —— | 1.270 |
| θ | 0° | -- | 8° |

Unit:mm

## Tape & Reel Information

Dimensions in mm




Pulling direction

## Marking Information：

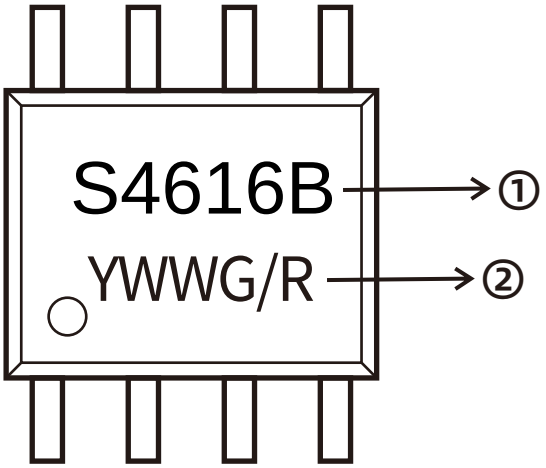
①. Part NO.

②. Date Code(YWWG / R)

Y：Year Code，last digit of the year

WW：Week Code(01-53)

G/R：G(Green) /R(Lead Free)




## Previous Version

| Version | Date | Subjects (major changes since last revision) |
|---|---|---|
| 1.0 | 2024-04-29 | Release of final version |

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