SHANGHAI SINO-IC
MICROELECTRONICS CO., LTD.

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Revision:A

# SED5852
# P-Channel Enhancement Mode Field Effect Transistor with Schottky Diode

## General Description

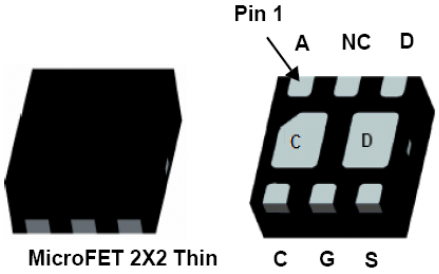
The SED5852 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. A Schottky diode is provided to facilitate the implementation of a bidirectional blocking switch, or for DC-DC conversion applications. Standard Product SED5852 is Pb-free (meets ROHS specifications).

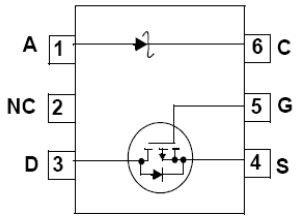
## Features

$V_{DS}$(V) = -20V
$I_D$ = -3.4A ( $V_{GS}$ = -4.5V)
$R_{DS(ON)}$< 90mΩ ( $V_{GS}$ = -4.5V)
$R_{DS(ON)}$< 120mΩ ( $V_{GS}$ = -2.5V)
$R_{DS(ON)}$< 160mΩ ( $V_{GS}$ = -1.8V)

## SCHOTTKY

$V_{DS}$(V)= 20V, $I_F$= 1A, $V_F$<0.5V@0.5A




## Absolute maximum ratings (Ta=25℃)

| Parameter | | Symbol | MOSFET | Schottky | Unit |
|---|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | -20 | | V |
| Gate-Source Voltage | | $V_{GS}$ | ±8 | | V |
| Continuous Drain Current [A] | $T_A$ =25℃ | $I_D$ | -3.2 | | A |
| | $T_A$ =70℃ | | -2.7 | | |
| Pulsed Drain Current [B] | | $I_{DM}$ | -15 | | |
| Schottky reverse voltage | | $V_{KA}$ | | 20 | V |
| Continuous Forward Current [A] | $T_A$ =25℃ | $I_F$ | | 1.9 | A |
| | $T_A$ =70℃ | | | 1.2 | |
| Pulsed Forward Current [B] | | $I_{FM}$ | | 7 | |
| Power Dissipation | $T_A$ =25℃ | $P_D$ | 1.7 | 0.96 | W |
| | $T_A$ =70℃ | | 1.1 | 0.62 | |
| Junction and Storage Temperature Rang | | $I_J$, $I_{STG}$ | -55 to 150 | -55 to 150 | ℃ |

| Parameter: Thermal Characteristics MOSFET | | Symbol | Typ | Max | Units |
|---|---|---|---|---|---|
| Maximum Junction-to-Ambient [A] | t ≤ 10s | $R_{\theta JA}$ | 51 | 75 | ℃/W |
| Maximum Junction-to-Ambient [A] | Steady-State | | 88 | 110 | |
| Maximum Junction-to-Lead [C] | Steady-State | $R_{\theta JL}$ | 28 | 35 | |
| **Thermal Characteristics Schottky** | | | | | |
| Maximum Junction-to-Ambient [A] | t ≤ 10s | $R_{\theta JA}$ | 66 | 80 | ℃/W |
| Maximum Junction-to-Ambient [A] | Steady-State | | 95 | 130 | |
| Maximum Junction-to-Lead [C] | Steady-State | $R_{\theta JL}$ | 40 | 50 | |

| Electrical Characteristics（TJ＝25℃ unless otherwise note） | | | | | | |
|---|---|---|---|---|---|---|
| **Symbol** | **Parameter** | **Conditions** | **Min** | **Typ** | **Max** | **Units** |
| **STATIC PARAMETERS** | | | | | | |
| $\mathbf{BV_{DSS}}$ | Drain-Source Breakdown Voltage | $I_D$= -250uA,$V_{GS}$=0V | -20 | | | V |
| $\mathbf{I_{DSS}}$ | Zero Gate Voltage Drain Current | $V_{DS}$= -16V,$V_{GS}$=0V | | | -1 | uA |
| | | $V_{DS}$= -16V,$V_{GS}$=0V ($T_J$=55℃) | | | -5 | uA |
| $\mathbf{I_{GSS}}$ | Gate-Body leakage current | $V_{DS}$=0V, $V_{GS}$=±8V | | | ±100 | nA |
| $\mathbf{V_{GS(IN)}}$ | Gate Threshold Voltage | $V_{DS}$= $V_{GS,}$ $I_D$= -250uA | -0.3 | -0.63 | -1 | V |
| $\mathbf{I_{D(ON)}}$ | On state drain current | $V_{GS}$= -4.5V, $V_{DS}$=-5V | -15 | | | A |
| $\mathbf{R_{DS(ON)}}$ | Static Drain-Source On-Resistance | $V_{GS}$= -4.5V, $I_D$= -3.4A | | 73 | 90 | mΩ |
| | | $V_{GS}$= -2.5V, $I_D$= -2.5A | | 99 | 120 | mΩ |
| | | $V_{GS}$= -1.8V, $I_D$= -1.5A | | 133 | 160 | mΩ |
| $\mathbf{g_{FS}}$ | Forward Transconductance | $V_{GS}$= -5V, $I_D$= -2.0A | 4 | 7 | | S |
| $\mathbf{V_{SD}}$ | Diode Forward Voltage | $V_{GS}$= 0V, $I_S$= -1A | | -0.83 | -1 | V |
| $\mathbf{I_S}$ | Maximum Body-Diode Continuous Current | | | | -2 | A |
| **DYNAMIC PARAMETERS** | | | | | | |
| $C_{ISS}$ | Input Capacitance | $V_{GS}$= 0V, $V_{DS}$= -10V,f= 1MHz | | 540 | | pF |
| $C_{OSS}$ | Output Capacitance | | | 72 | | pF |
| $C_{RSS}$ | Reverse Transfer Capacitance | | | 49 | | pF |
| $R_g$ | Gate resistance | $V_{GS}$= 0V, $V_{DS}$= 0V,f= 1MHz | | 12 | | Ω |
| **SWITCHING PARAMETERS** | | | | | | |
| $Q_g$ | Total Gate Charge | $V_{GS}$=-4.5V,$V_{DS}$=-10V,$I_D$= -3.4A | | 6.1 | | nC |
| $Q_{gs}$ | Gate Source Charge | | | 0.6 | | nC |
| $Q_{gd}$ | Gate Drain Charge | | | 16 | | nC |
| $T_{D(on)}$ | Turn-On DelayTime | $V_{GS}$= -4.5V, $V_{DS}$= -10V, $R_L$= 2.9Ω, $R_{GEN}$= 3Ω | | 10 | | ns |
| $t_r$ | Turn-On Rise Time | | | 12 | | ns |
| $T_{D(off)}$ | Turn-Off DelayTime | | | 44 | | ns |
| $t_f$ | Turn-Off Fall Time | | | 22 | | ns |
| $t_{rr}$ | Reverse Recovery Time | $I_F$= -3.4A,dI/dt=100A/us | | 21 | | ns |
| $Q_{rr}$ | Reverse Recovery Charge | $I_F$= -3.4A,dI/dt=100A/us | | 7.5 | | nC |
| **SCHOTTKY PARAMETERS** | | | | | | |
| $V_F$ | Forward Voltage Drop | $I_F$= 0.5A | | 0.39 | 0.5 | V |
| $I_{rm}$ | Maximum reverse leakage current | $V_R$=16V | | | 0.05 | mA |
| | | $V_R$= 16V, $T_J$=125℃ | | | 10 | |
| $C_T$ | Junction Capacitance | $V_R$= 10V | | 34 | | pF |
| $t_{rr}$ | SchottkyReverse Recovery Time | $I_F$= 1A,dI/dt=100A/us | | 5.2 | 10 | Ns |
| $Q_{rr}$ | Schottky Reverse Recovery Charge | $I_F$= 1A,dI/dt=100A/us | | 0.8 | | nC |

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

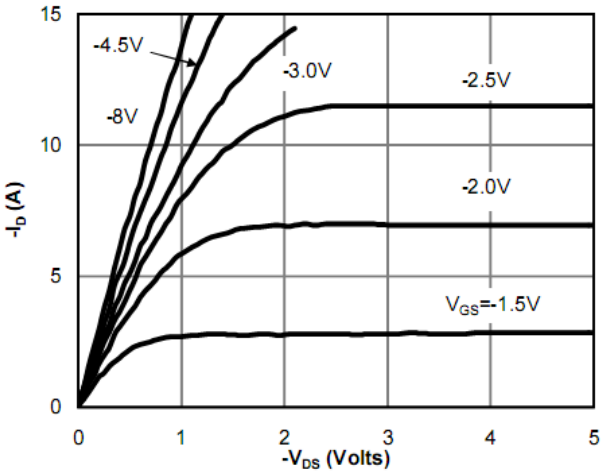



Fig 1: On-Region Characteristics

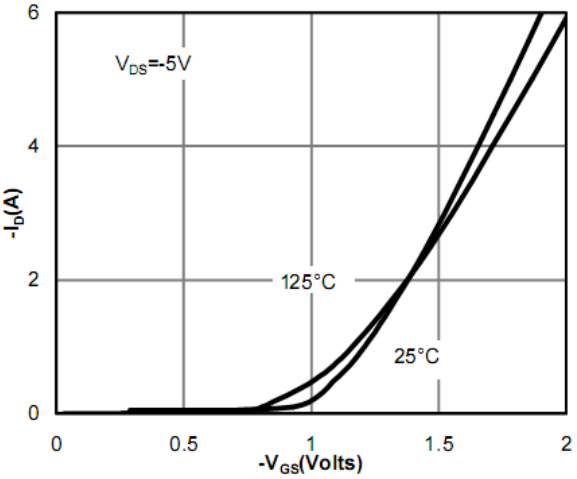



Figure 2: Transfer Characteristics

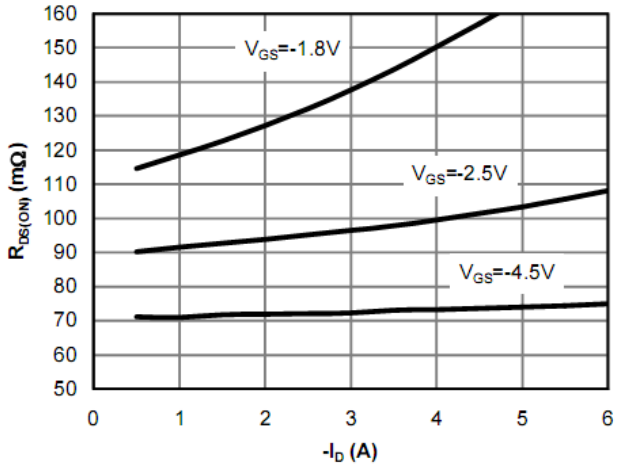



Figure 3: On-Resistance vs. Drain Current and Gate Voltage

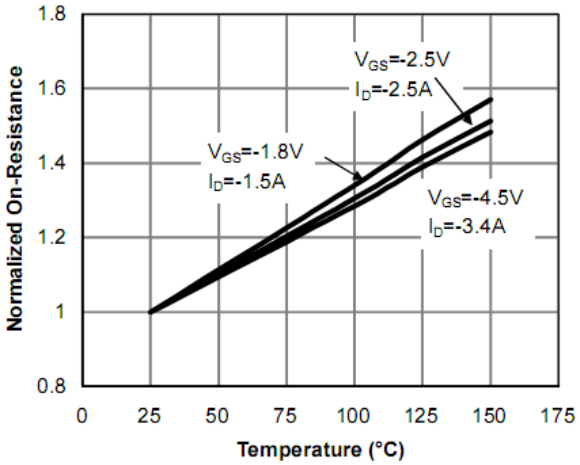



Figure 4: On-Resistance vs. Junction Temperature

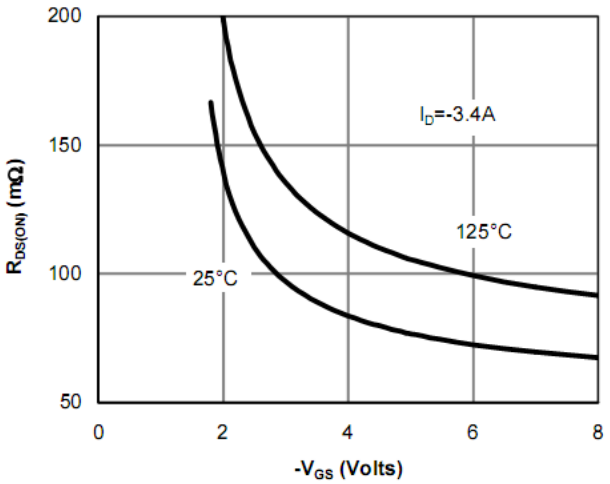



Figure 5: On-Resistance vs. Gate-Source Voltage

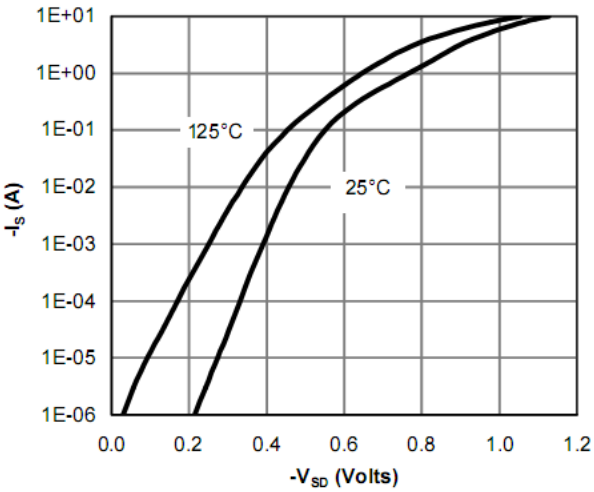



Figure 6: Body-Diode Characteristics

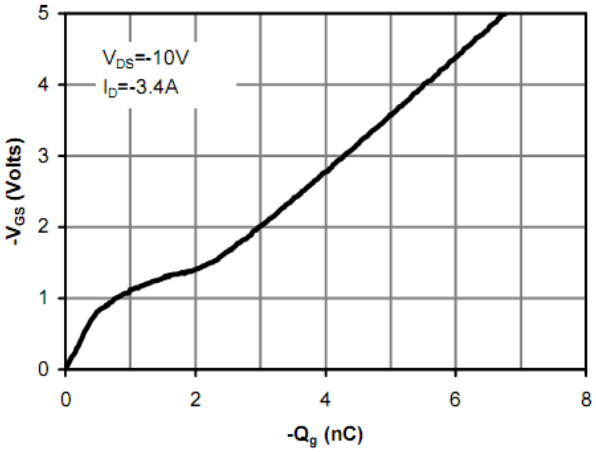



Figure 7: Gate-Charge Characteristics

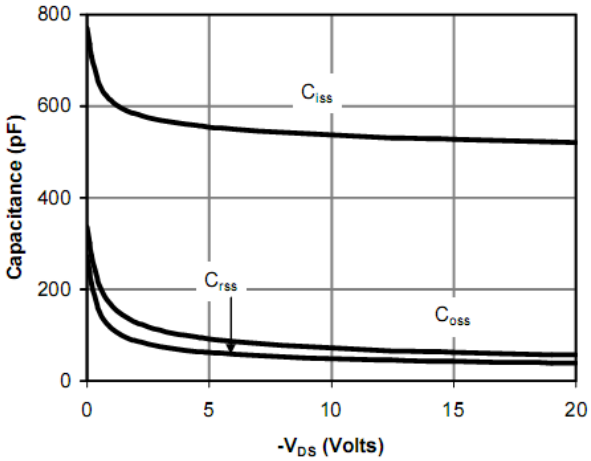



Figure 8: Capacitance Characteristics

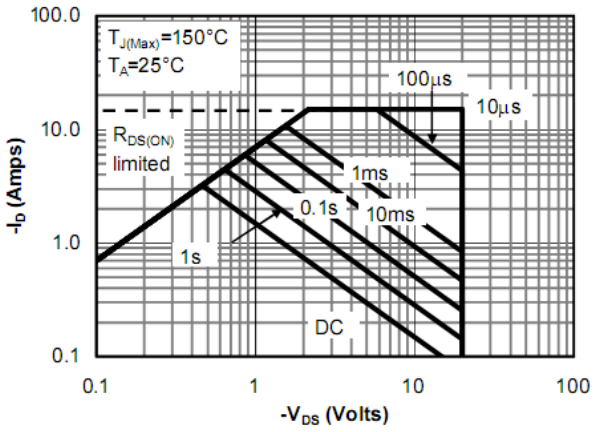



Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

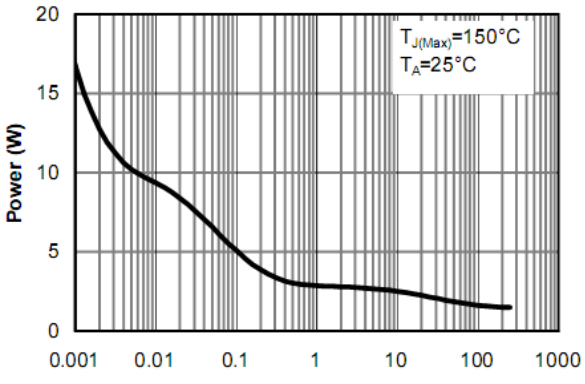



Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

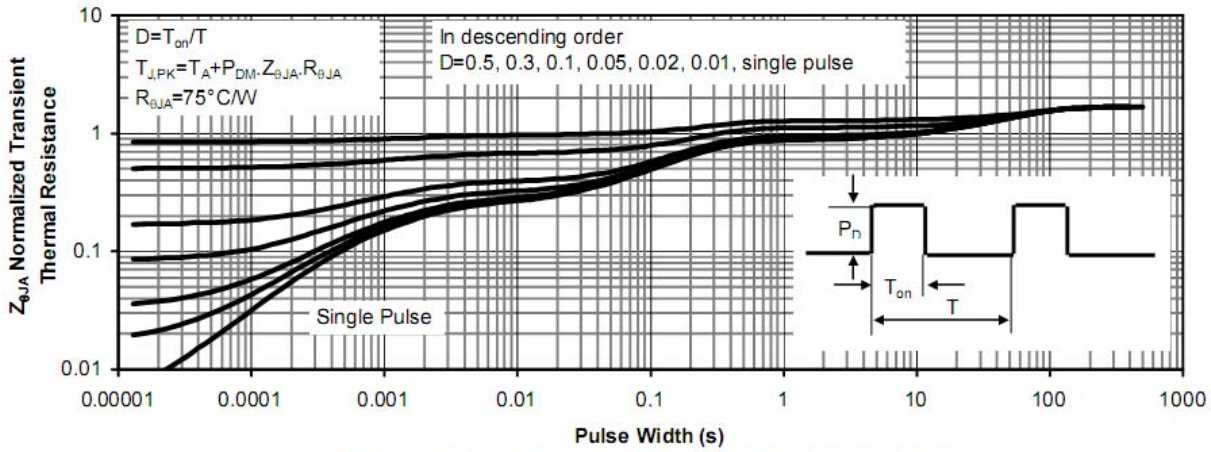



Figure 11: Normalized Maximum Transient Thermal Impedance

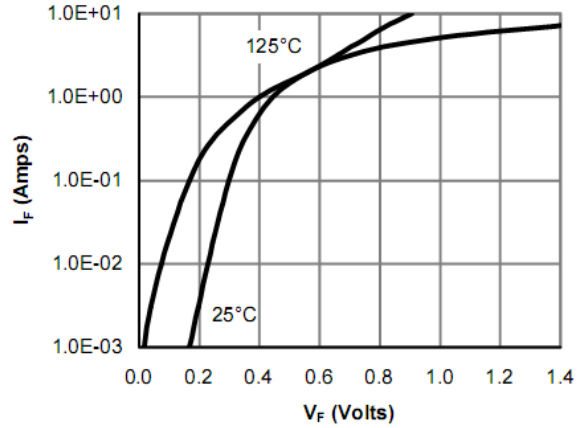



Figure 12: Schottky Forward Characteristics

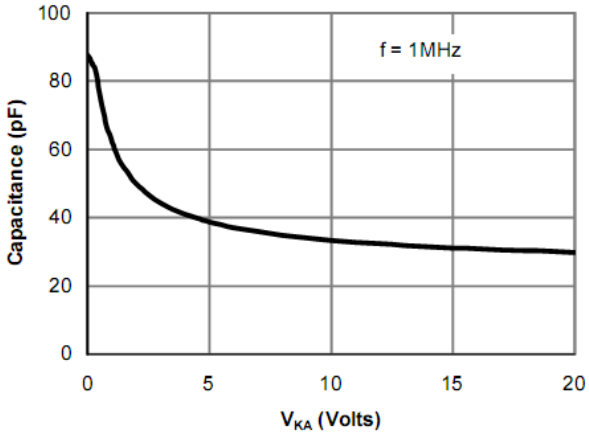



Figure 13: Schottky Capacitance Characteristics

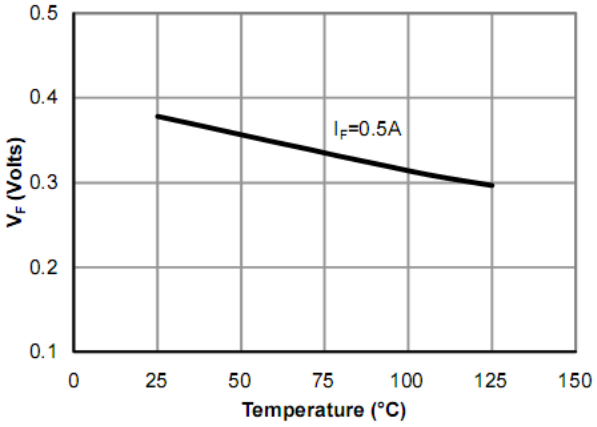



Figure 14: Schottky Forward Drop vs. Junction Temperature

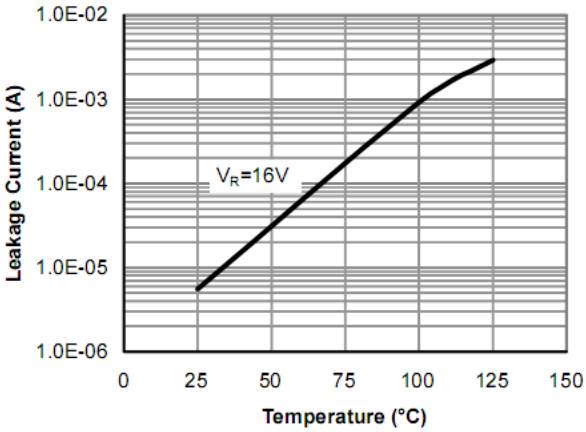



Figure 15: Schottky Leakage current vs. Junction Temperature

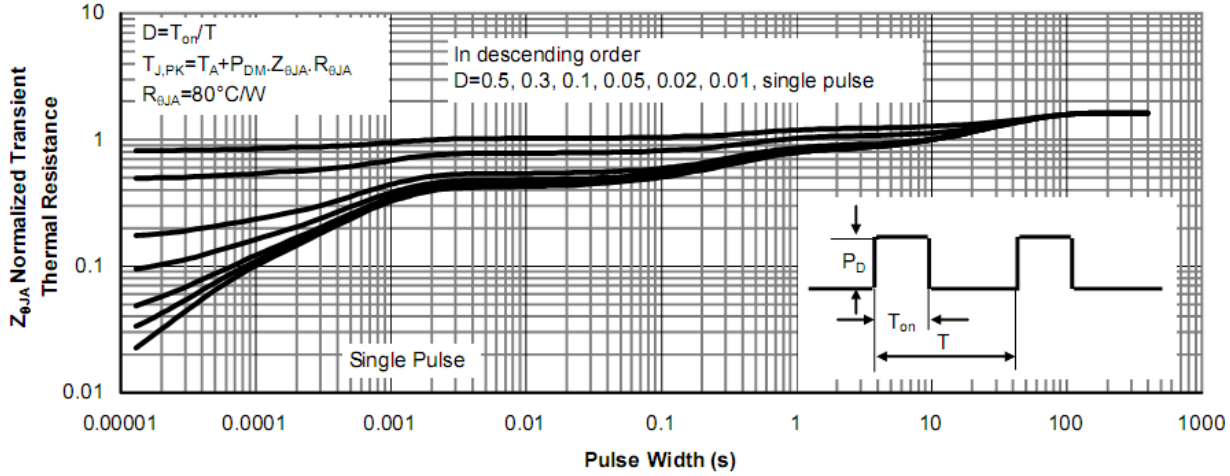
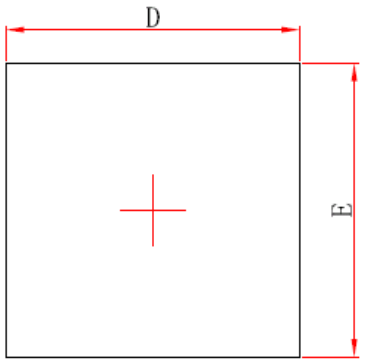
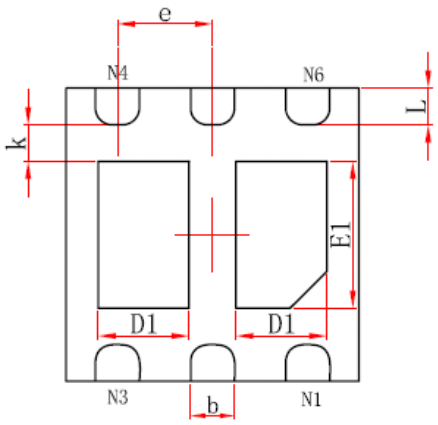



Figure 16: Schottky Normalized Maximum Transient Thermal Impedance

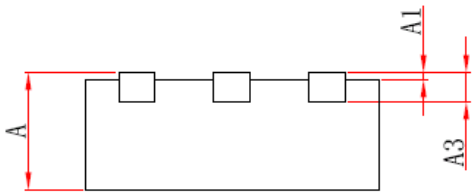
DFNWB2×2-6L-A(P0.65T0.75/0.85) PACKAGE OUTLINE DIMENSIONS




Top View




Bottom View




Side View

| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 0.700/0.800 | 0.800/0.900 | 0.028/0.031 | 0.031/0.035 |
| A1 | 0.000 | 0.050 | 0.000 | 0.002 |
| A3 | 0.203REF. | | 0.008REF. | |
| D | 1.924 | 2.076 | 0.076 | 0.082 |
| E | 1.924 | 2.076 | 0.076 | 0.082 |
| D1 | 0.520 | 0.720 | 0.020 | 0.028 |
| E1 | 0.900 | 1.100 | 0.035 | 0.043 |
| k | 0.200MIN. | | 0.008MIN. | |
| b | 0.250 | 0.350 | 0.010 | 0.014 |
| e | 0.650TYP. | | 0.026TYP. | |
| L | 0.174 | 0.326 | 0.007 | 0.013 |

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