

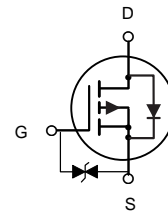


Description

The Si2323DS-T1-E3 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a load switch or in PWM applications. It is ESD protected.



SOT-23



P-Channel MOSFET

General Features

$V_{DS} = -20V, I_D = -5A$

$R_{DS(ON)} < 40m\Omega @ V_{GS} = -4.5V$

$R_{DS(ON)} < 60m\Omega @ V_{GS} = -2.5V$

ESD Rating: 1500V HBM

Application

PWM application
Load switch

Package Marking and Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|----------------|--------|------------|----------|
| Si2323DS-T1-E3 | SOT-23 | HXY MOSFET | 3000 |

Absolute Maximum Ratings ($T_A = 25^\circ C$ unless otherwise noted)

| Symbol | Parameter | Limit | Unit |
|-----------------|--|------------|--------------|
| V_{DS} | Drain-Source Voltage | -20 | V |
| V_{GS} | Gate-Source Voltage | ± 10 | V |
| I_D | Drain Current-Continuous | -5 | A |
| I_{DM} | Drain Current-Pulsed (Note 1) | -30 | A |
| P_D | Maximum Power Dissipation | 1.4 | W |
| T_J, T_{STG} | Operating Junction and Storage Temperature Range | -55 To 150 | $^\circ C$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient (Note 2) | 89.3 | $^\circ C/W$ |



Electrical Characteristics (TA=25°C unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|--------------|---|-------|-------|----------|------------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=-250\mu A$ | -20 | | - | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=-20V, V_{GS}=0V$ | - | - | 1 | μA |
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 10V, V_{DS}=0V$ | - | - | ± 10 | μA |
| On Characteristics (Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=-250\mu A$ | -0.35 | -0.55 | -0.9 | V |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS}=-4.5V, I_D=-4A$ | - | 30 | 40 | m Ω |
| | | $V_{GS}=-2.5V, I_D=-4A$ | - | 44 | 60 | m Ω |
| Forward Transconductance | g_{FS} | $V_{DS}=-5V, I_D=-4A$ | 8 | - | - | S |
| Dynamic Characteristics (Note4) | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}=-10V, V_{GS}=0V,$ $F=1.0MHz$ | - | 950 | - | PF |
| Output Capacitance | C_{oss} | | - | 165 | - | PF |
| Reverse Transfer Capacitance | C_{rss} | | - | 120 | - | PF |
| Switching Characteristics (Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}=-10V, R_L=2.5\Omega$ $V_{GS}=-4.5V, R_{GEN}=3\Omega$ | - | 12 | | nS |
| Turn-on Rise Time | t_r | | - | 10 | | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 19 | | nS |
| Turn-Off Fall Time | t_f | | - | 25 | | nS |
| Total Gate Charge | Q_g | $V_{DS}=-10V, I_D=-4A,$ $V_{GS}=-4.5V$ | - | 12 | | nC |
| Gate-Source Charge | Q_{gs} | | - | 1.4 | - | nC |
| Gate-Drain Charge | Q_{gd} | | - | 3.6 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage (Note 3) | V_{SD} | $V_{GS}=0V, I_S=-4A$ | - | - | -1.2 | V |
| Diode Forward Current (Note 2) | I_S | | - | - | -4 | A |

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

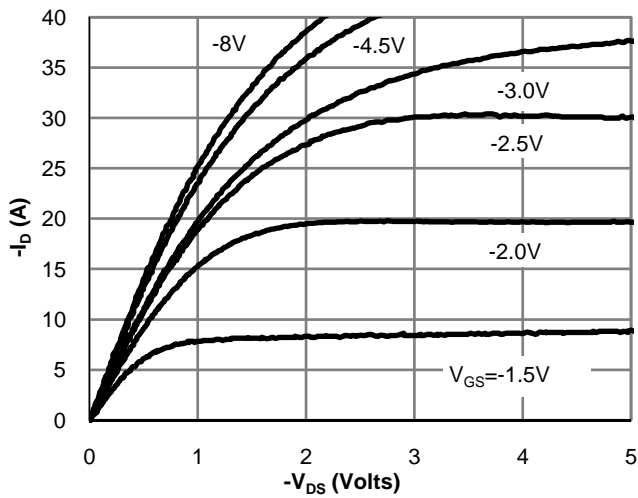


Fig 1: On-Region Characteristics (Note E)

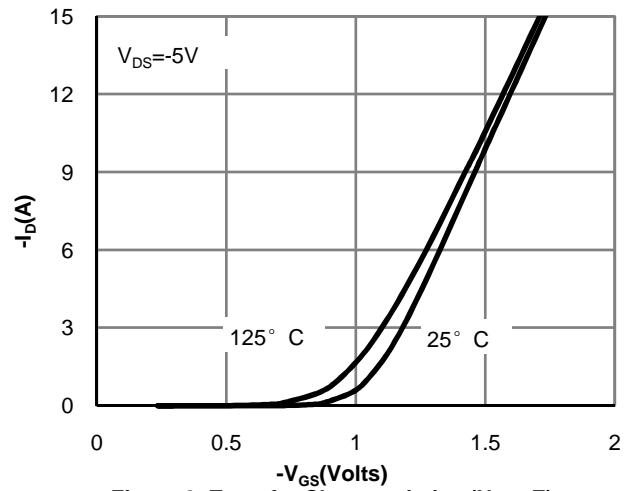


Figure 2: Transfer Characteristics (Note E)

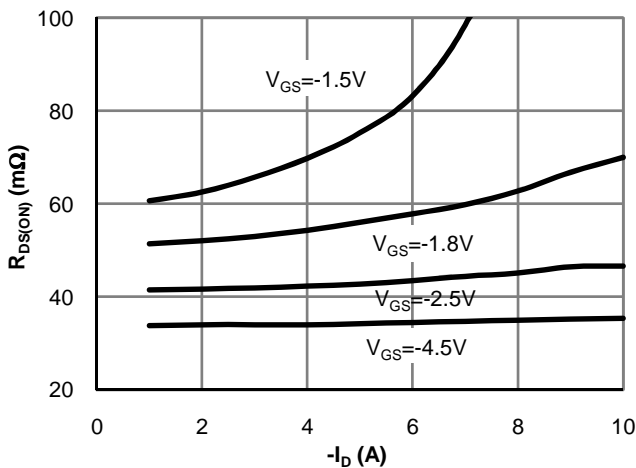


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

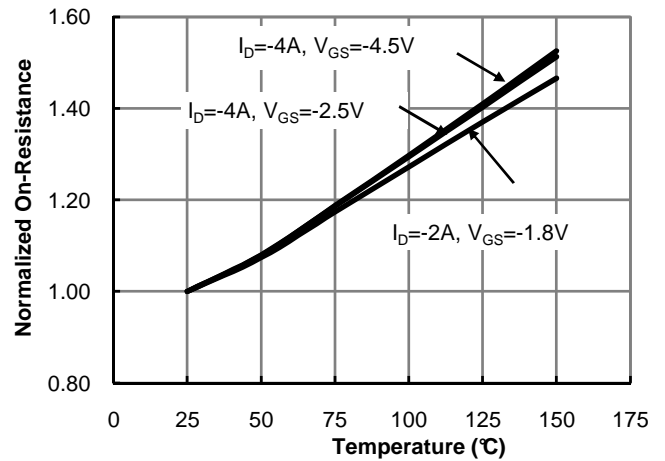


Figure 4: On-Resistance vs. Junction Temperature (Note E)

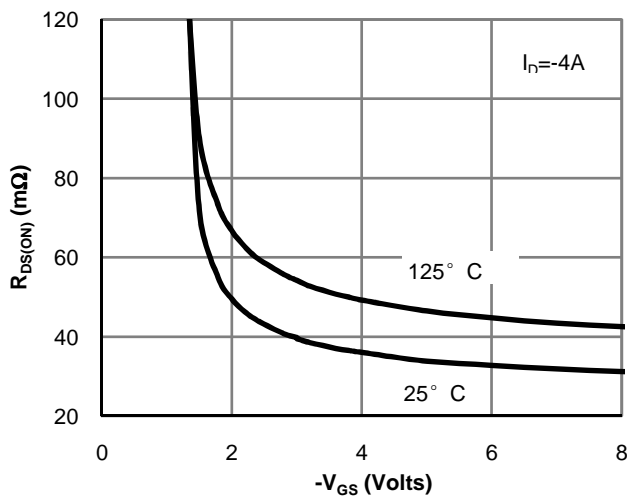


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

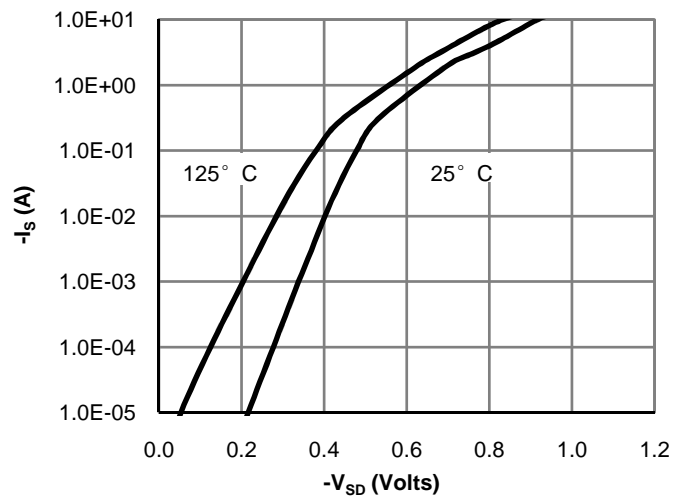


Figure 6: Body-Diode Characteristics (Note E)



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

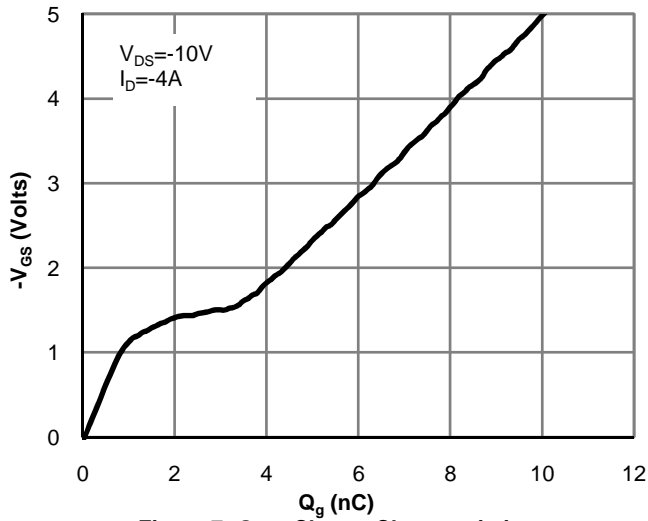


Figure 7: Gate-Charge Characteristics

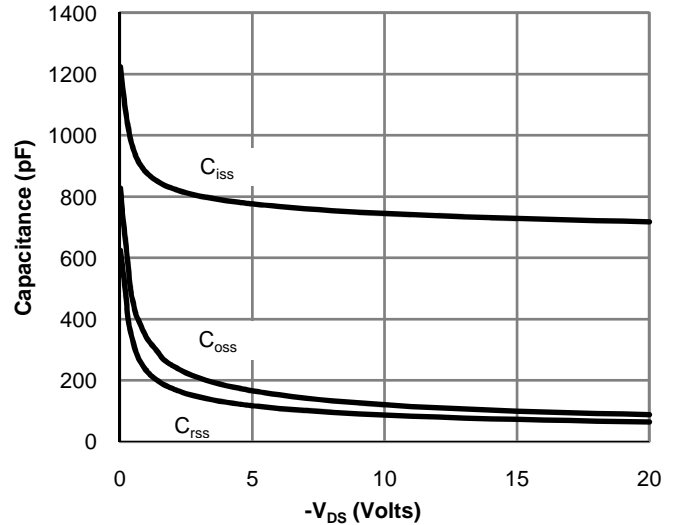


Figure 8: Capacitance Characteristics

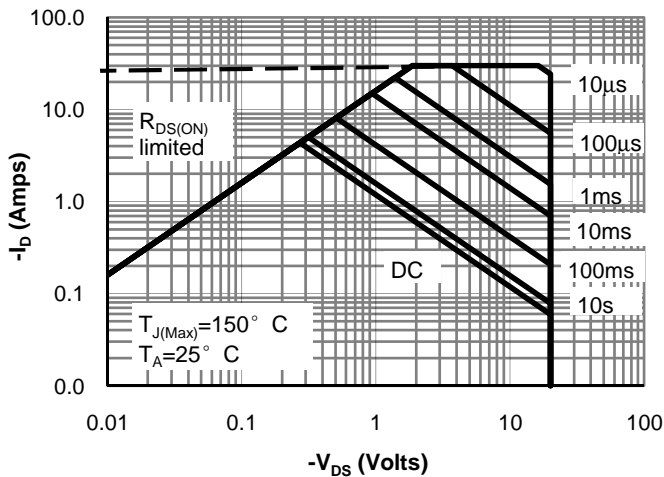


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

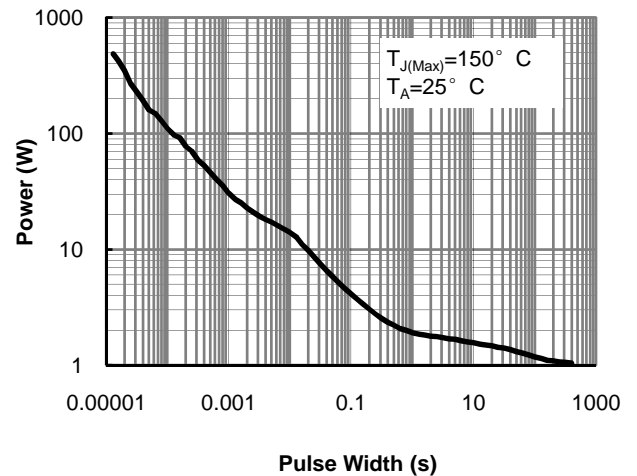


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

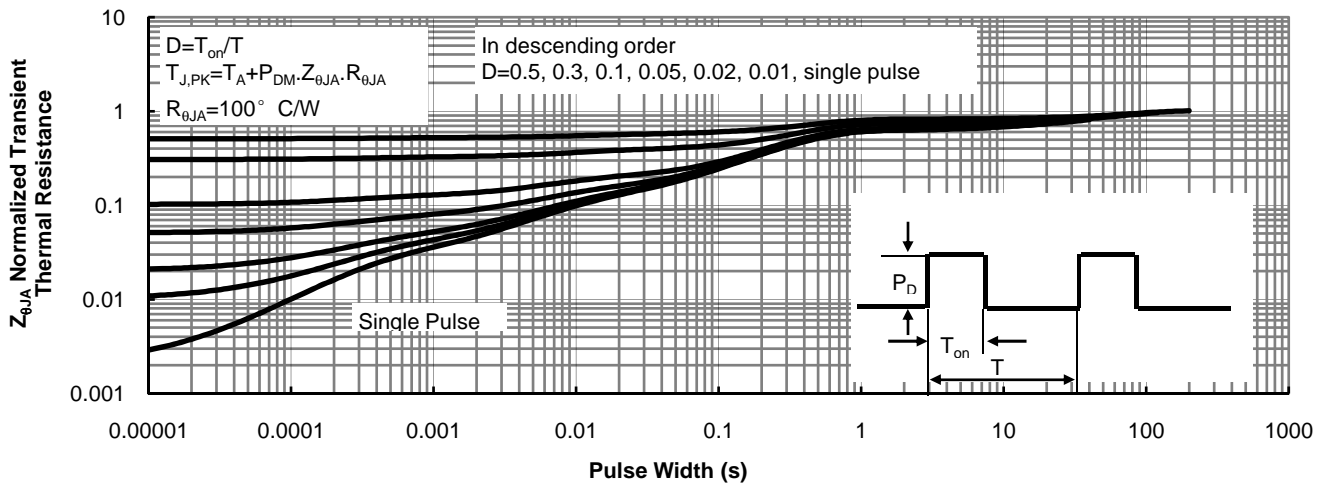
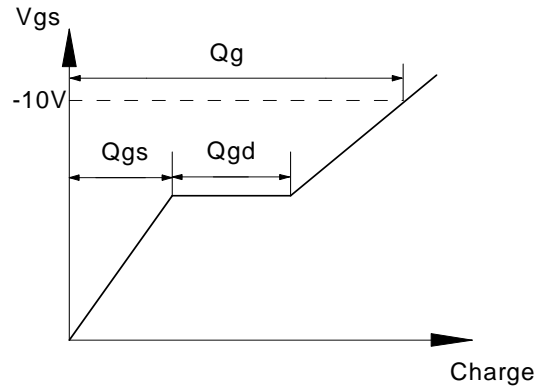
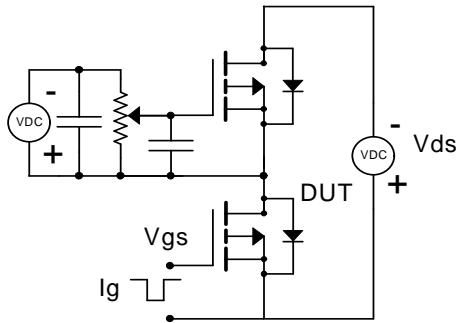


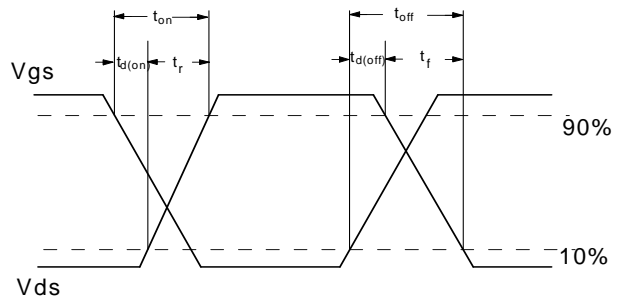
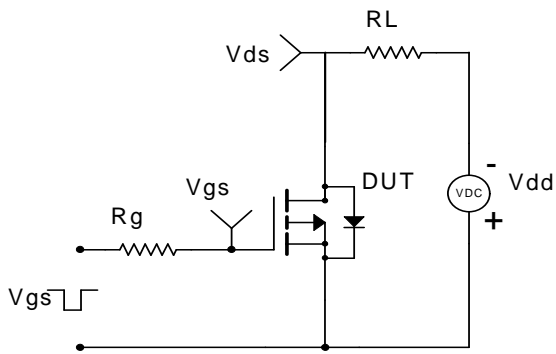
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)



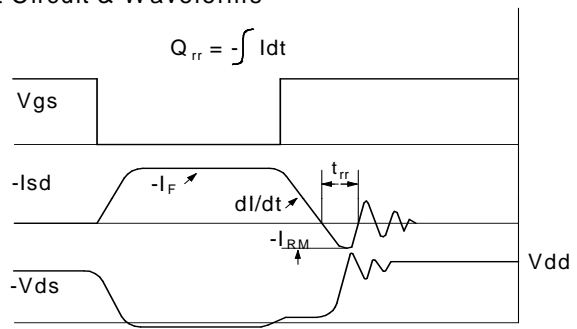
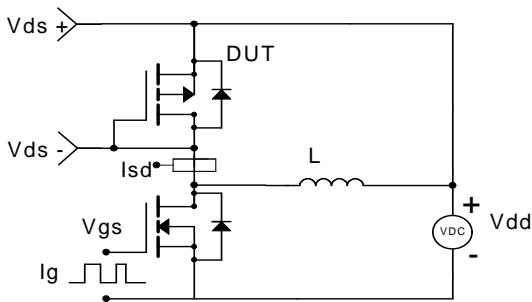
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

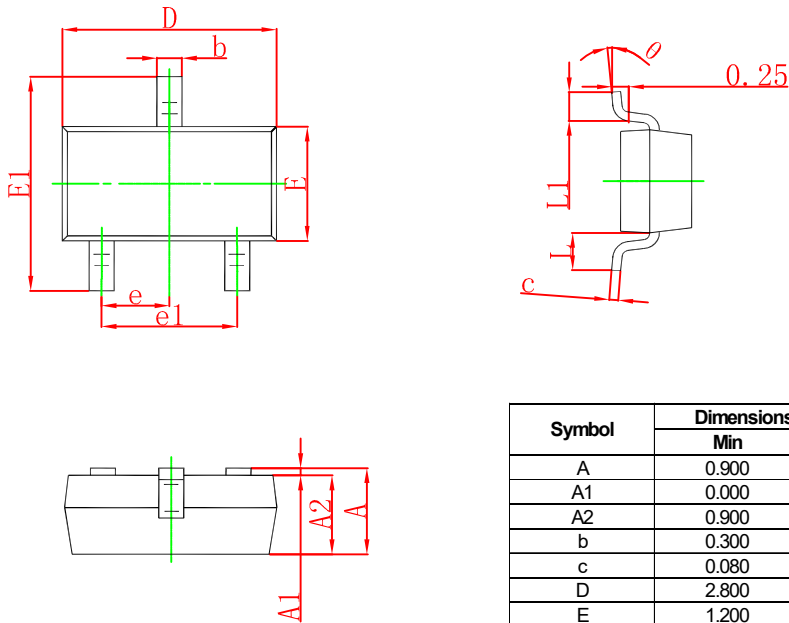


Diode Recovery Test Circuit & Waveforms



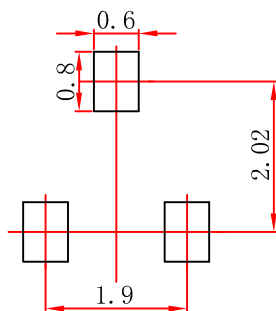


SOT-23 Package Outline Dimensions



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 0.900 | 1.150 | 0.035 | 0.045 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 0.900 | 1.050 | 0.035 | 0.041 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.080 | 0.150 | 0.003 | 0.006 |
| D | 2.800 | 3.000 | 0.110 | 0.118 |
| E | 1.200 | 1.400 | 0.047 | 0.055 |
| E1 | 2.250 | 2.550 | 0.089 | 0.100 |
| e | 0.950 TYP | | 0.037 TYP | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.550 REF | | 0.022 REF | |
| L1 | 0.300 | 0.500 | 0.012 | 0.020 |
| θ | 0° | 8° | 0° | 8° |

SOT-23 Suggested Pad Layout



Note:

1. Controlling dimension: in millimeters.
2. General tolerance: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.



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