

P-Channel Enhancement Mode Power MOSFET
DESCRIPTION

The 60P03 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V.

GENERAL FEATURES

- $V_{DS} = -30V, I_D = -20A$
 $R_{DS(ON)} < 30m\Omega @ V_{GS} = -4.5V$
 $R_{DS(ON)} < 17m\Omega @ V_{GS} = -10V$
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

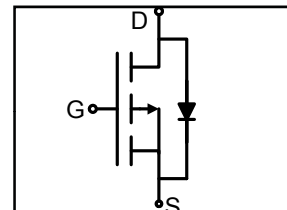
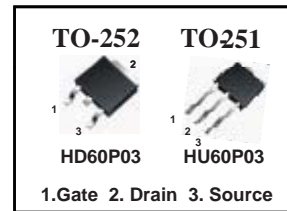
Application

- Battery Switch
- Load switch
- Power management

$$BV_{DSS} = -30V$$

$$R_{DS(on) \text{ typ}} = 13 \text{ m}\Omega$$

$$I_D = -50 \text{ A}$$


Absolute Maximum Ratings (TA=25°C unless otherwise noted)

| Parameter | | Symbol | Limit | Unit |
|--------------------------------------------------------|---------------------------|----------------|------------|------|
| Drain-Source Voltage | | V_{DS} | -30 | V |
| Gate-Source Voltage | | V_{GS} | ±20 | V |
| Continuous Drain Current ($T_J = 150^\circ\text{C}$) | $T_C = 25^\circ\text{C}$ | I_D | -50 | A |
| | $T_C = 100^\circ\text{C}$ | | -35 | |
| Drain Current-Pulsed (Note 1) | | I_{DM} | -50 | A |
| Maximum Power Dissipation | | P_D | 60 | W |
| Operating Junction and Storage Temperature Range | | T_J, T_{STG} | -55 To 150 | °C |

Thermal Characteristic

| | | | |
|--------------------------------------------------|-----------------|-----|------|
| Thermal Resistance, Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 2.5 | °C/W |
|--------------------------------------------------|-----------------|-----|------|

Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|-------------------------------------------|--------------|-----------------------------------------------------------|-----|------|-----------|------------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=-250\mu A$ | -30 | - | - | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=-30V, V_{GS}=0V$ | - | - | -1 | μA |
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | - | - | ± 100 | nA |
| On Characteristics (Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=-250\mu A$ | -1 | -1.5 | -3 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}=-10V, I_D=-15A$ | - | 13 | 17 | m Ω |
| | | $V_{GS}=-4.5V, I_D=-10A$ | - | 20 | 30 | m Ω |
| Forward Transconductance | g_{FS} | $V_{DS}=-5V, I_D=-10A$ | 10 | - | - | S |
| Dynamic Characteristics (Note4) | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}=-15V, V_{GS}=0V,$ $F=1.0MHz$ | - | 1700 | - | PF |
| Output Capacitance | C_{oss} | | - | 258 | - | PF |
| Reverse Transfer Capacitance | C_{rss} | | - | 108 | - | PF |
| Switching Characteristics (Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}=-15V, I_D=-1A,$ $V_{GS}=-10V, R_{GEN}=6\Omega$ | - | 10 | - | nS |
| Turn-on Rise Time | t_r | | - | 26 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 35 | - | nS |
| Turn-Off Fall Time | t_f | | - | 8 | - | nS |
| Total Gate Charge | Q_g | $V_{DS}=-15V, I_D=-10A$ $V_{GS}=-10V$ | - | 30 | - | nC |
| Gate-Source Charge | Q_{gs} | | - | 6 | - | nC |
| Gate-Drain Charge | Q_{gd} | | - | 9 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage (Note 3) | V_{SD} | $V_{GS}=0V, I_S=-10A$ | - | - | -1.2 | V |

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

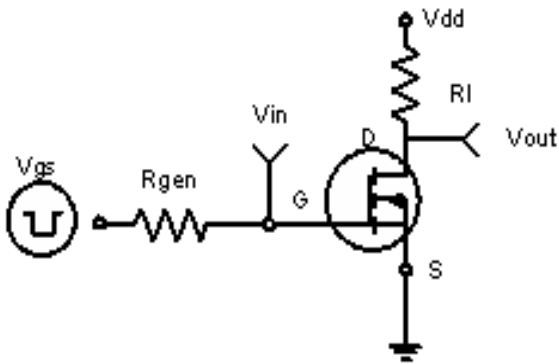


Figure 1: Switching Test Circuit

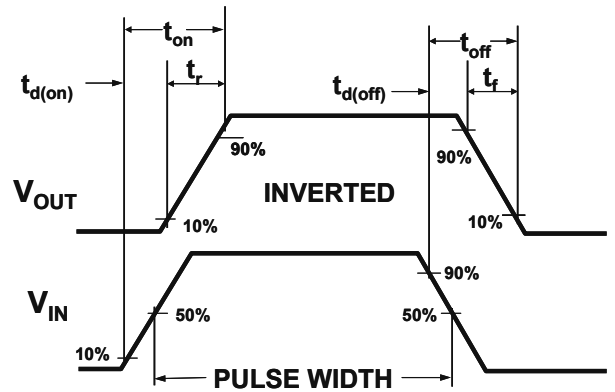


Figure 2: Switching Waveforms

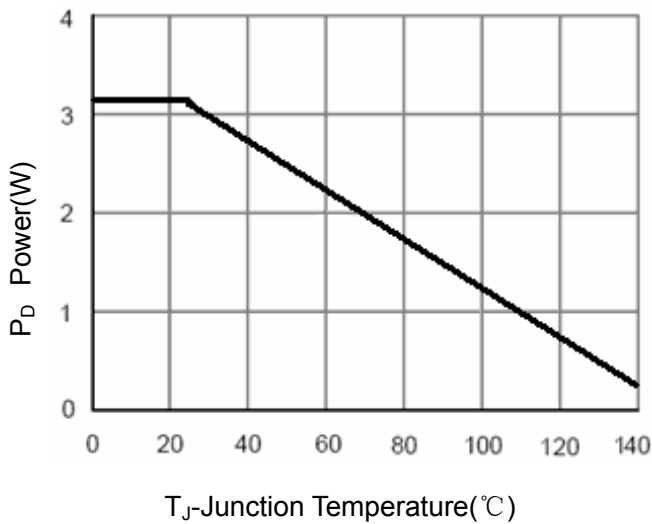


Figure 3 Power Dissipation

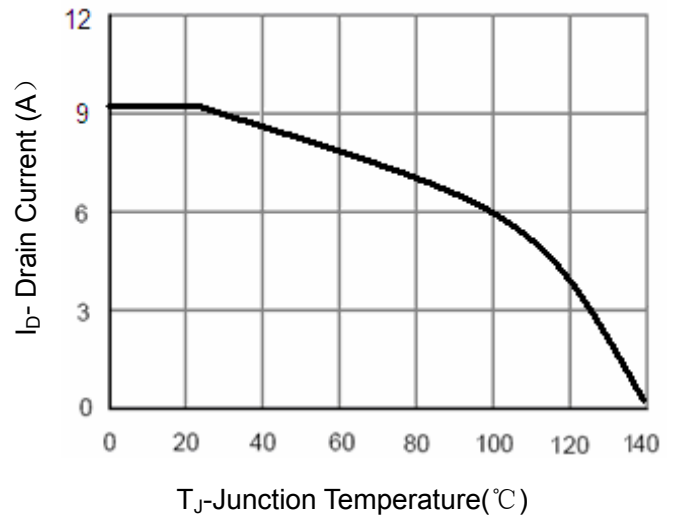


Figure 4 Drain Current

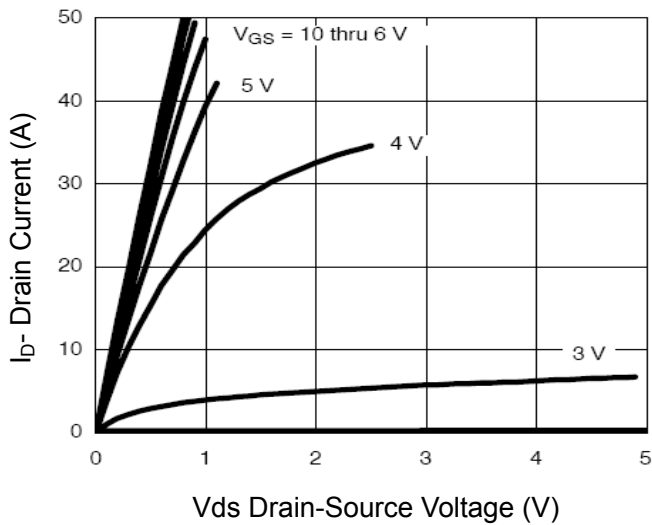


Figure 5 Output CHARACTERISTICS

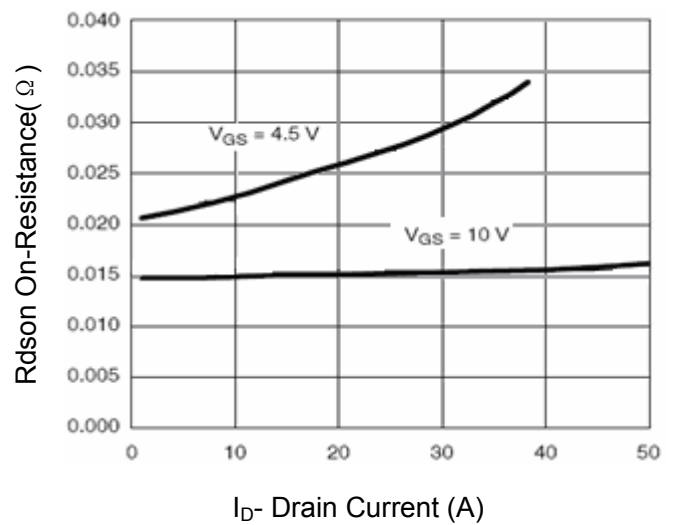


Figure 6 Drain-Source On-Resistance

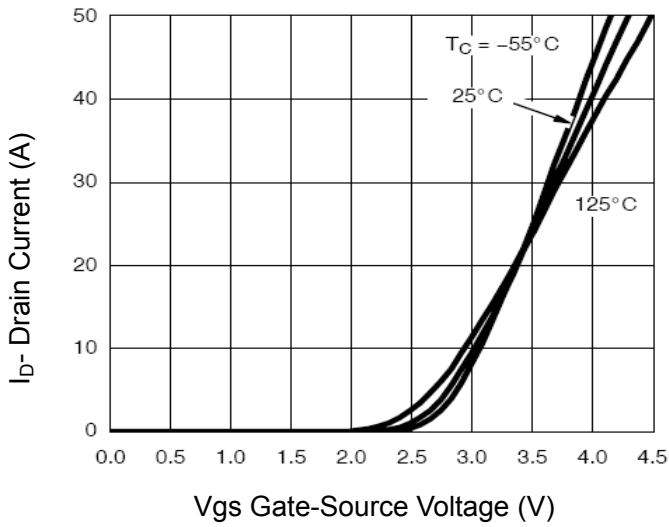


Figure 7 Transfer Characteristics

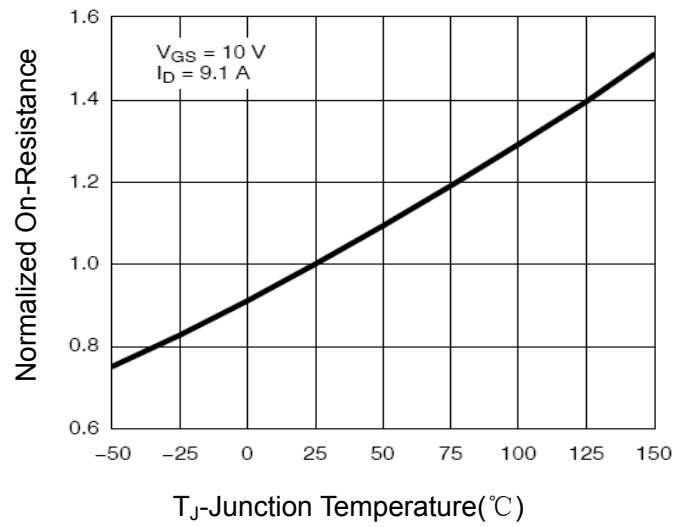


Figure 8 Drain-Source On-Resistance

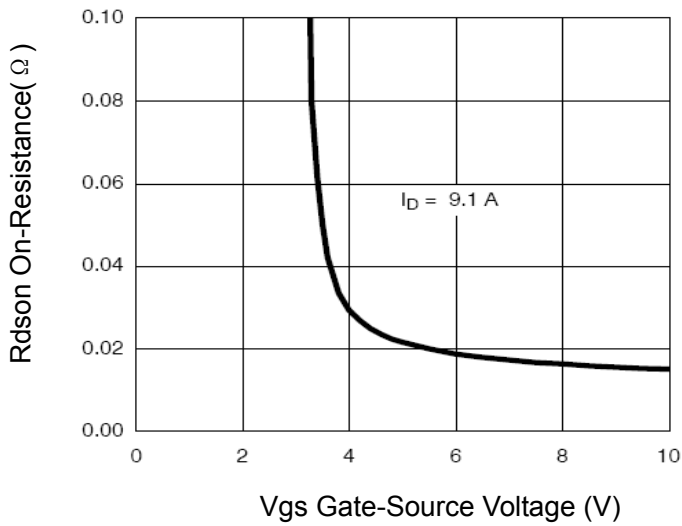


Figure 9 Rdson vs Vgs

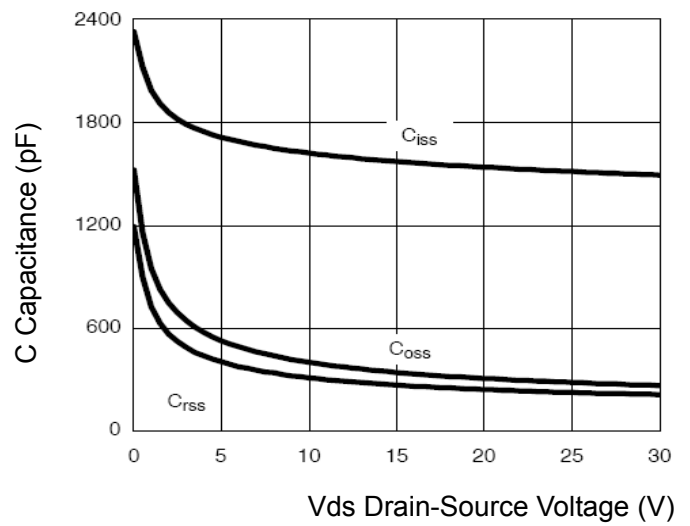


Figure 10 Capacitance vs Vds

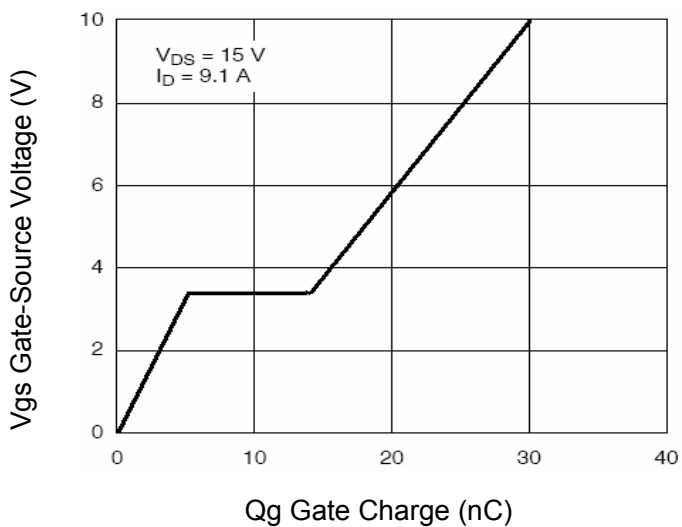


Figure 11 Gate Charge

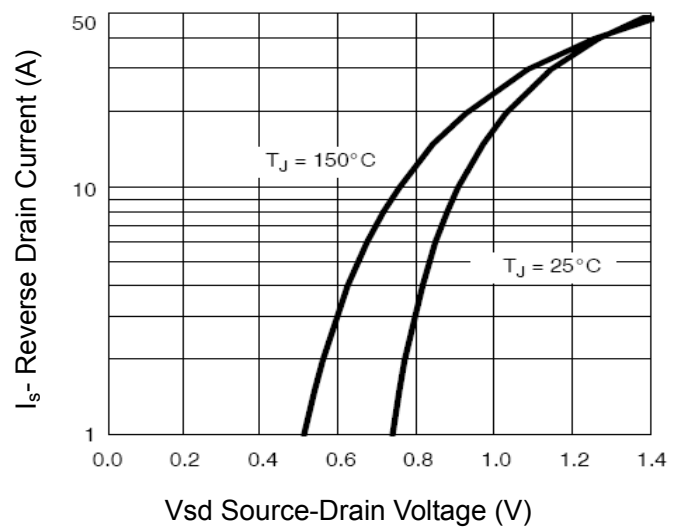


Figure 12 Source- Drain Diode Forward

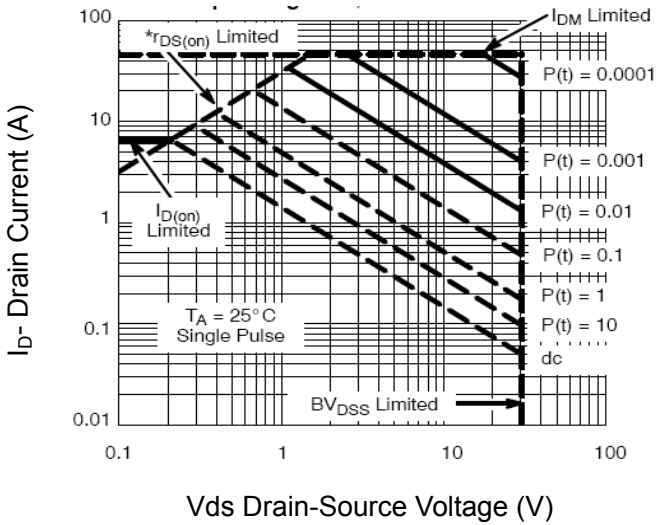


Figure 13 Safe Operation Area

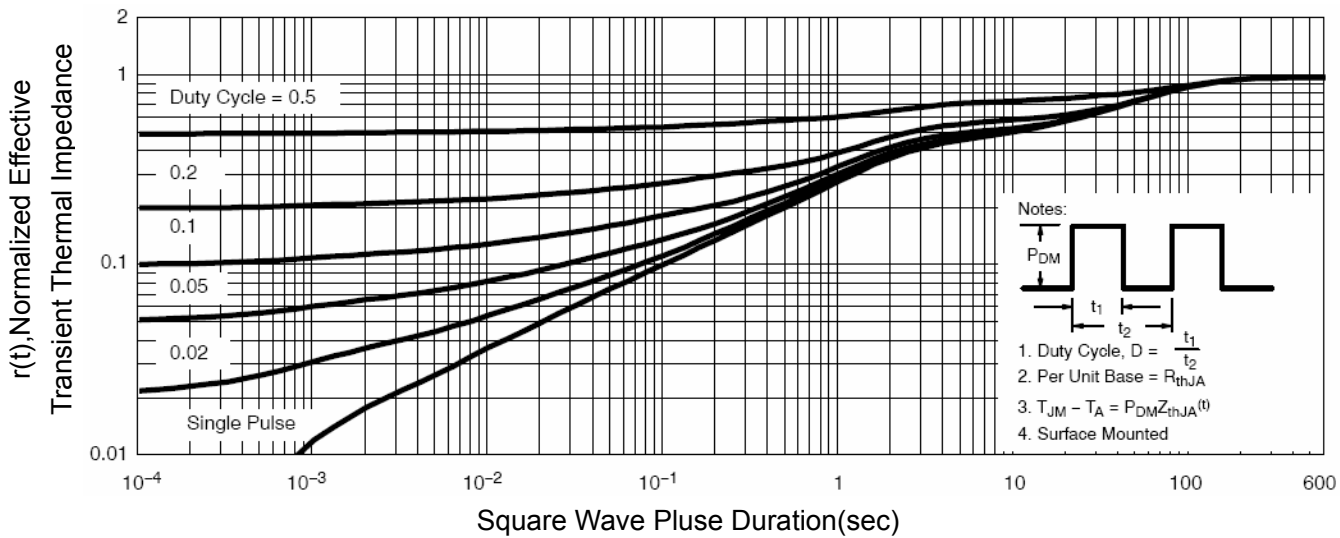
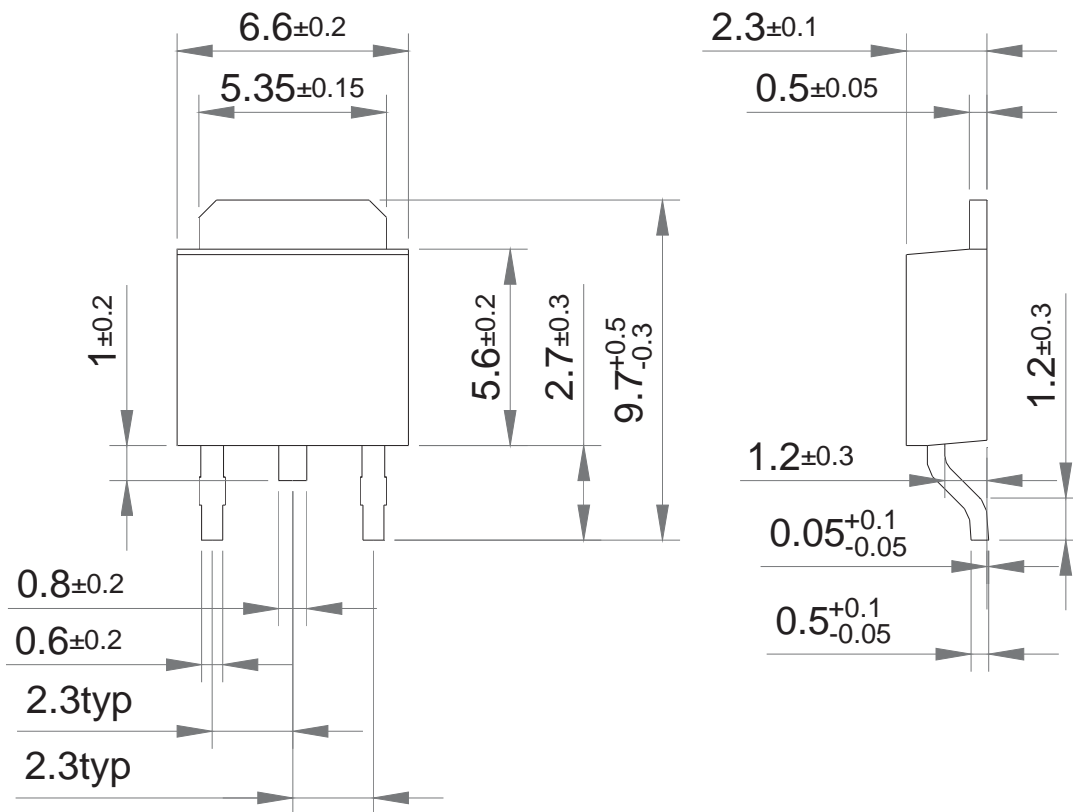


Figure 14 Normalized Maximum Transient Thermal Impedance

Package Dimension

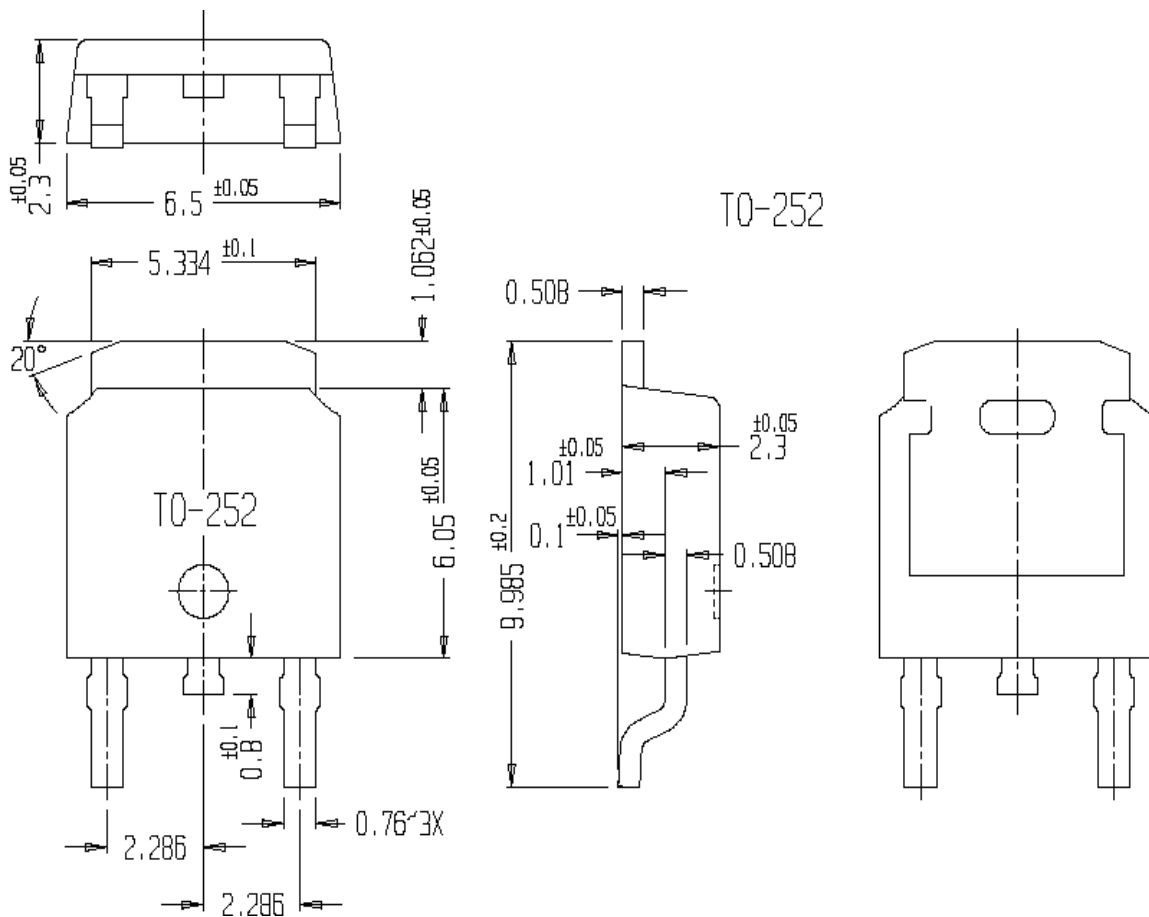
TO-252



HD60P03 / HU60P03

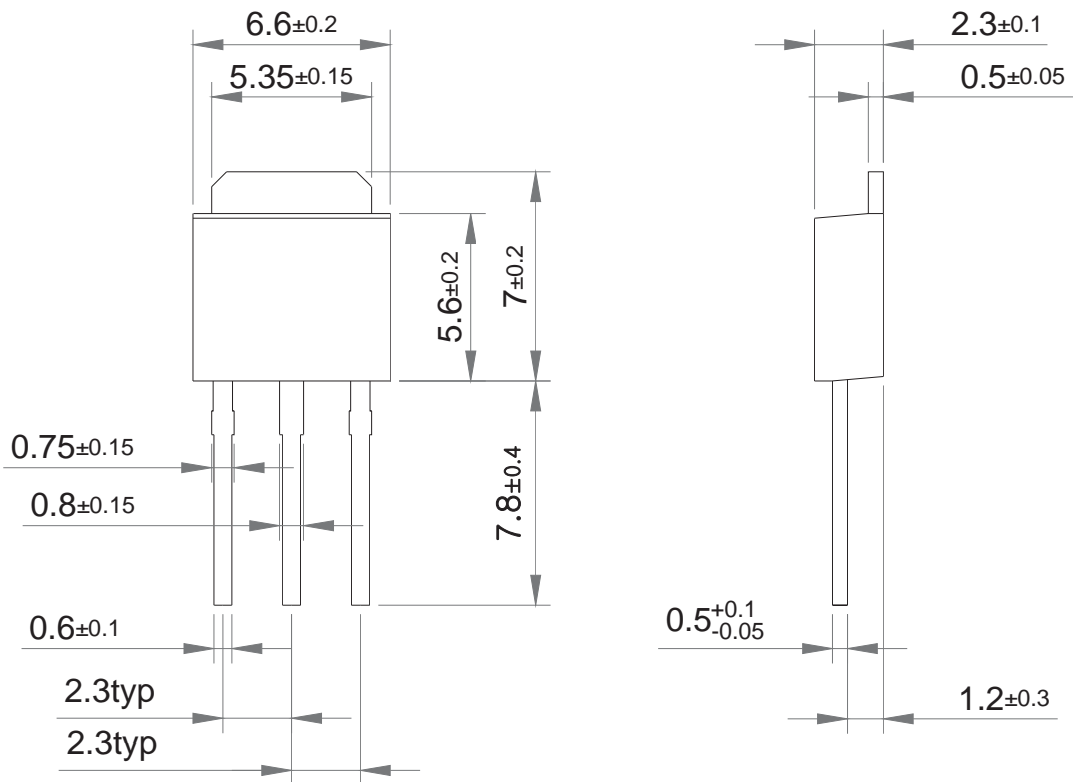
Package Dimension

TO-252



Package Dimension

TO-251



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