

**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

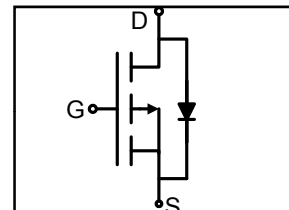
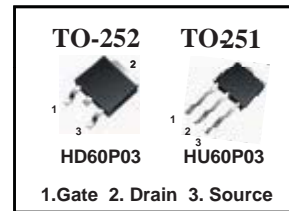
**Application**

- Battery Switch
- Load switch
- Power management

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

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

$$I_D = -50 A$$


**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 ( $T_J = 150^\circ C$ )	$T_C = 25^\circ C$	$I_D$	-50	A
	$T_C = 100^\circ C$		-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
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**Electrical Characteristics ( $T_A = 25^\circ C$  unless otherwise noted)**

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
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	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics (Note 3)</b>						
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 $\Omega$
		$V_{GS}=-4.5V, I_D=-10A$	-	20	30	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=-5V, I_D=-10A$	10	-	-	S
<b>Dynamic Characteristics (Note4)</b>						
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
<b>Switching Characteristics (Note 4)</b>						
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
<b>Drain-Source Diode Characteristics</b>						
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

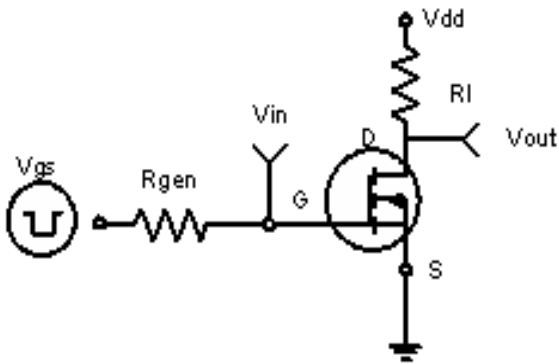


Figure 1: Switching Test Circuit

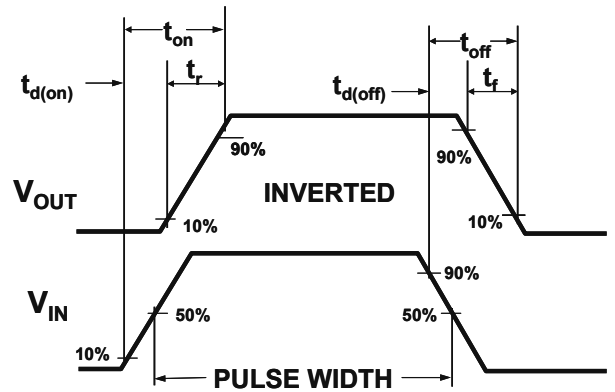


Figure 2: Switching Waveforms

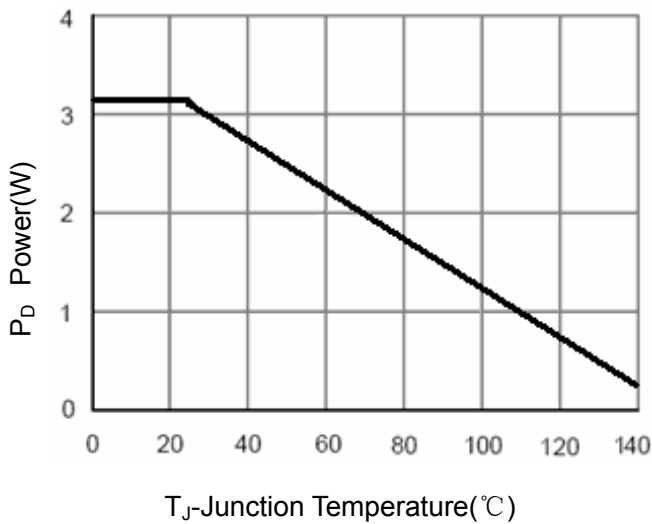


Figure 3 Power Dissipation

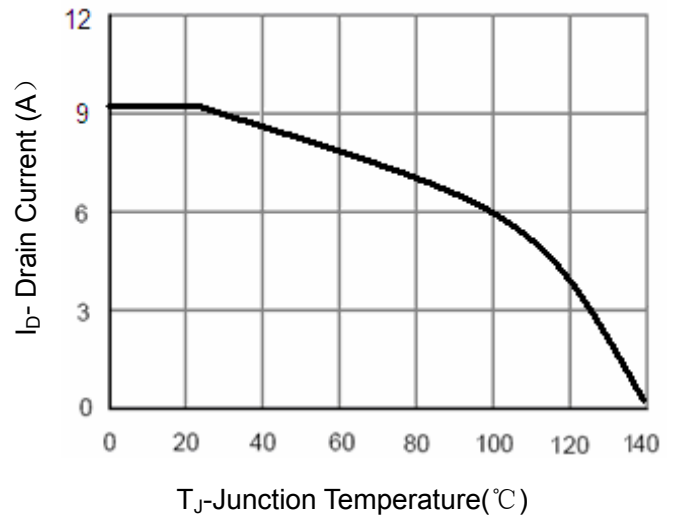


Figure 4 Drain Current

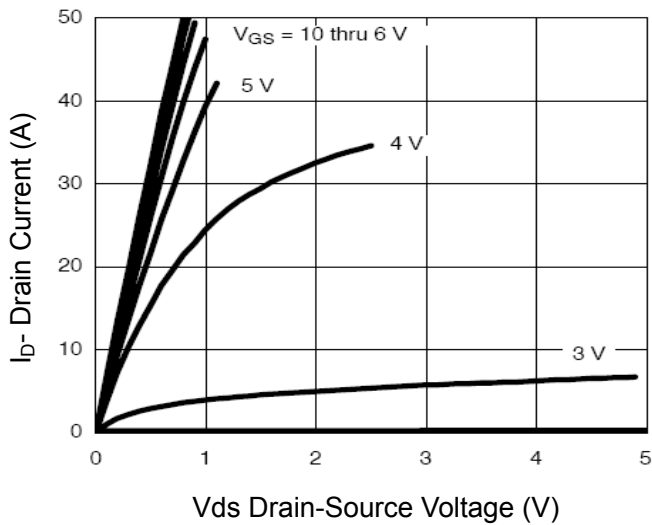


Figure 5 Output CHARACTERISTICS

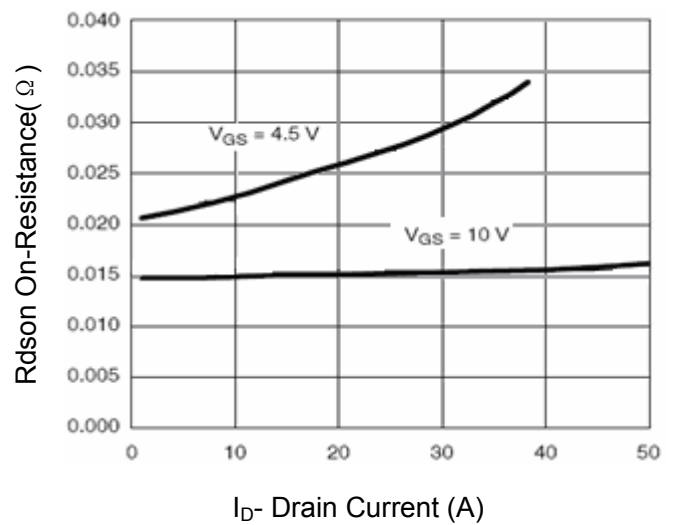
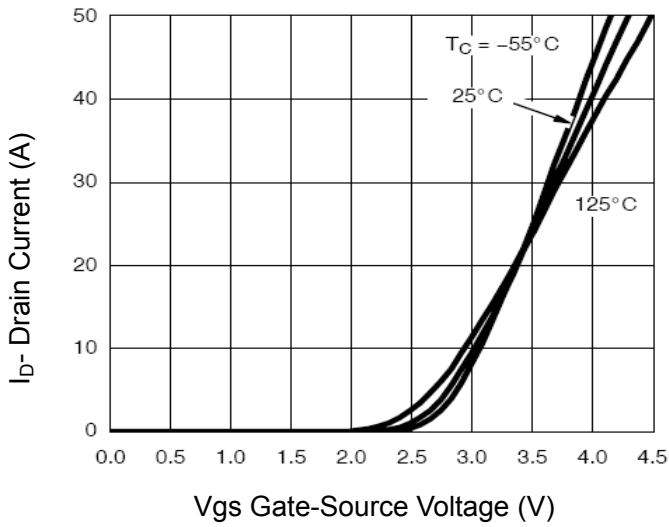
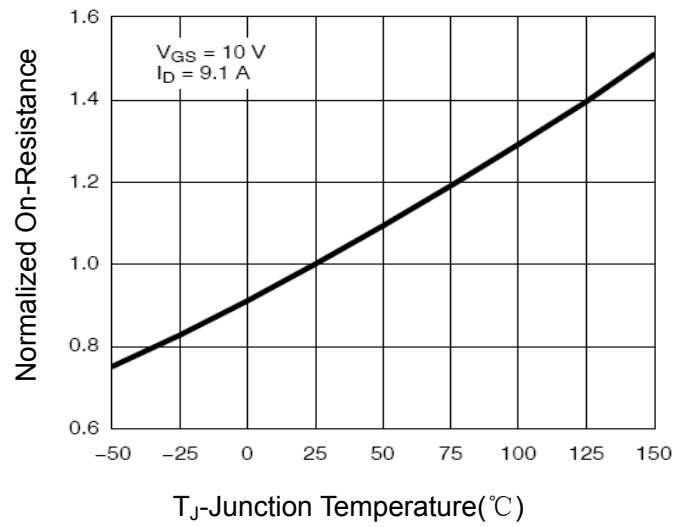


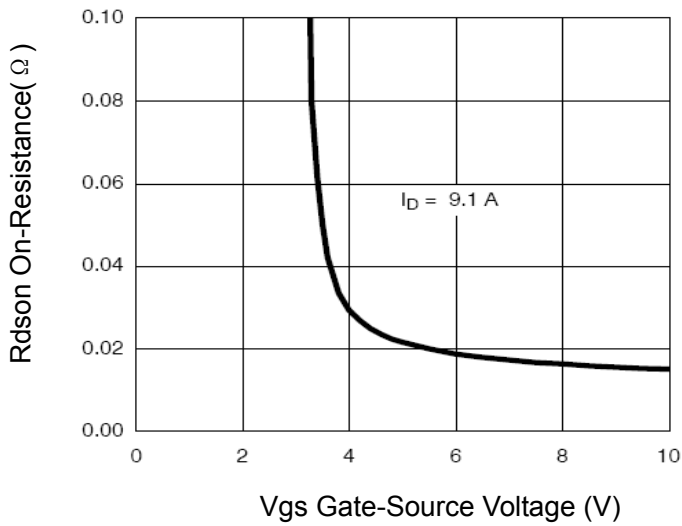
Figure 6 Drain-Source On-Resistance



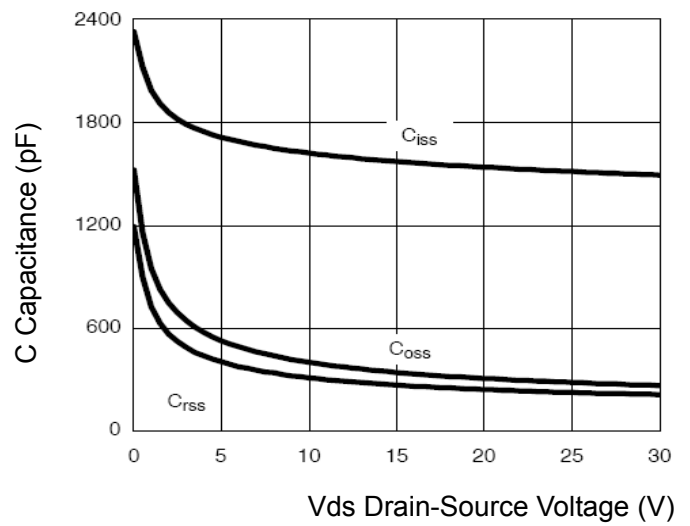
**Figure 7 Transfer Characteristics**



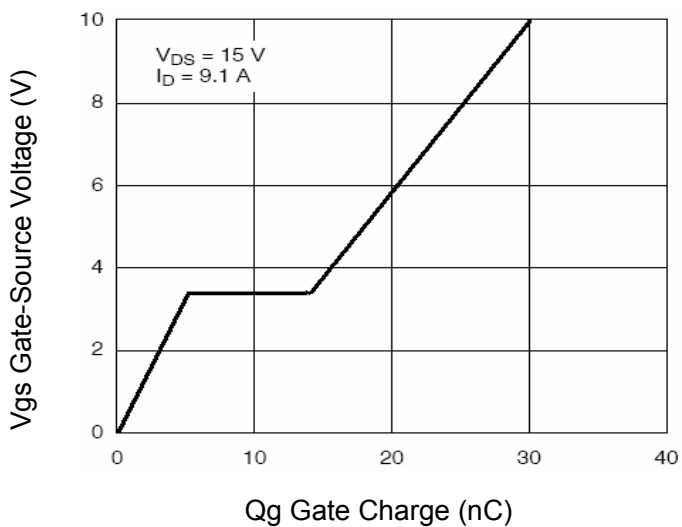
**Figure 8 Drain-Source On-Resistance**



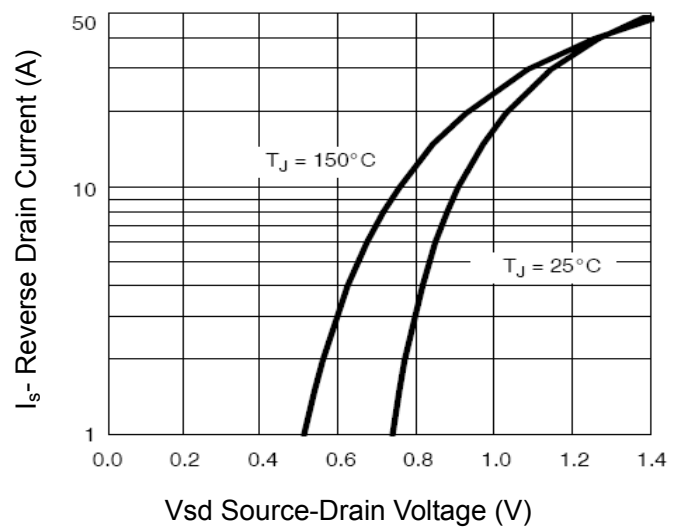
**Figure 9 Rdson vs VGS**



**Figure 10 Capacitance vs Vds**



**Figure 11 Gate Charge**



**Figure 12 Source- Drain Diode Forward**

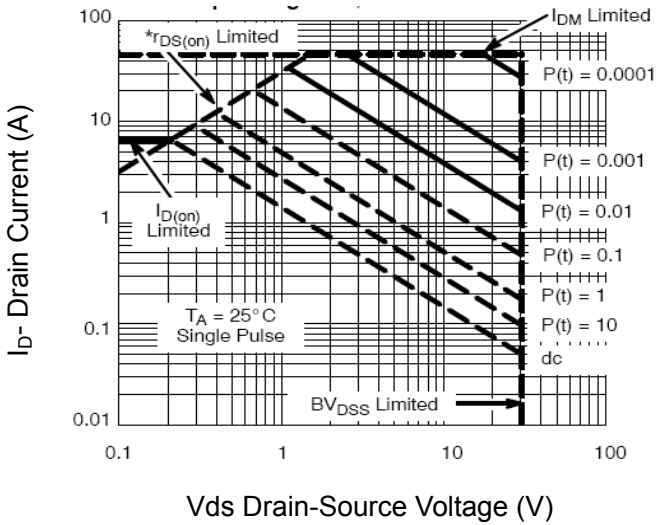


Figure 13 Safe Operation Area

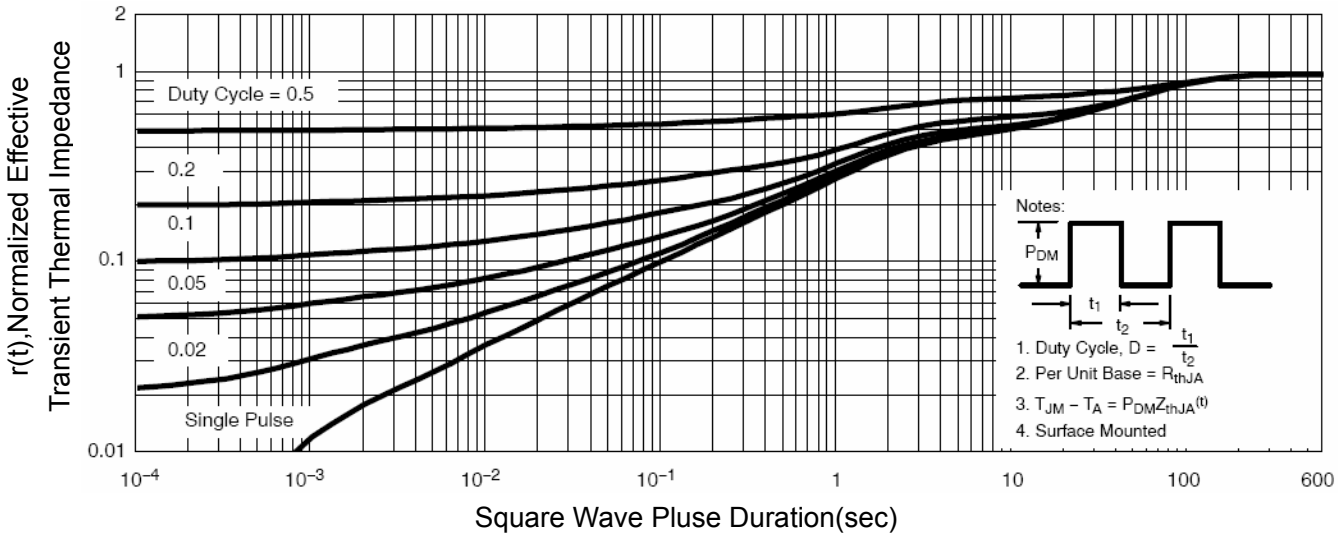
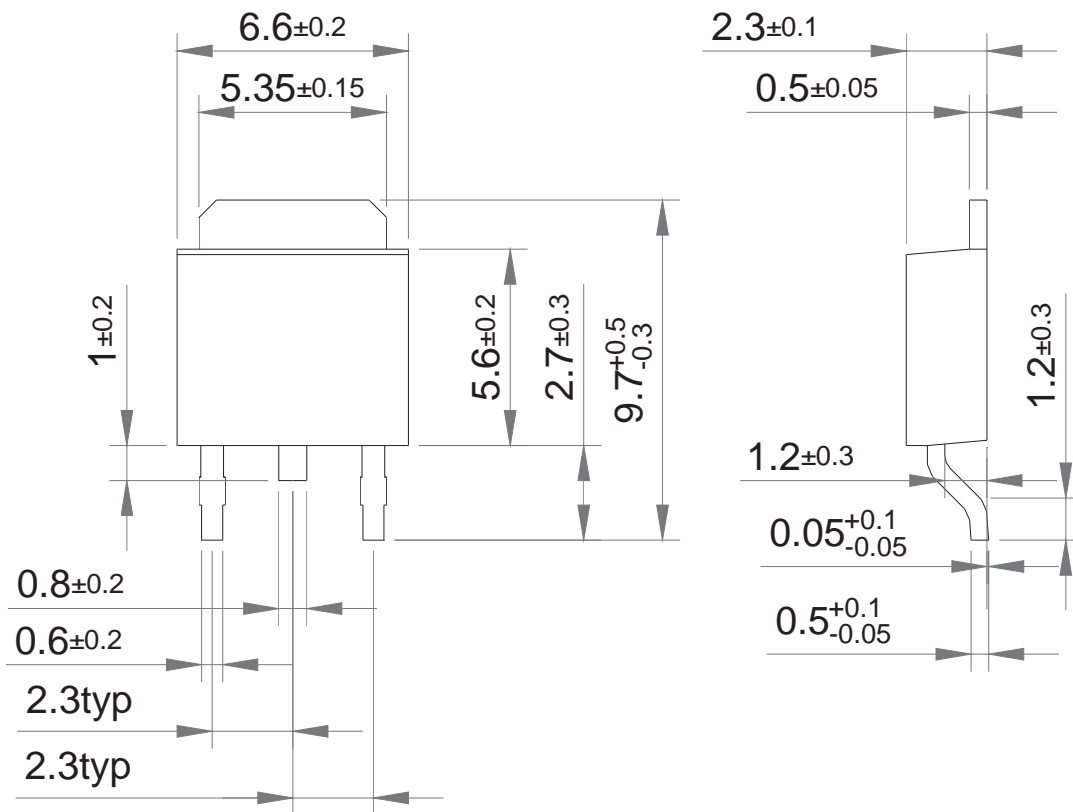


Figure 14 Normalized Maximum Transient Thermal Impedance

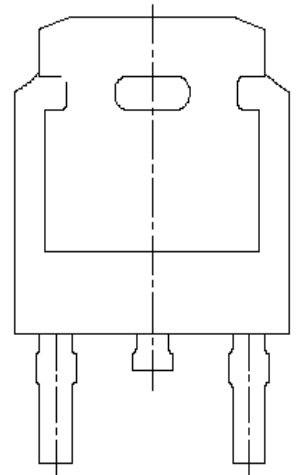
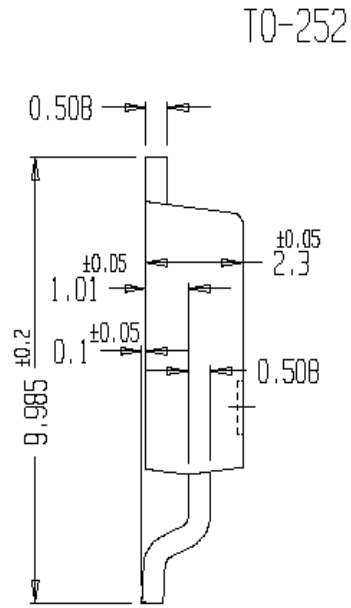
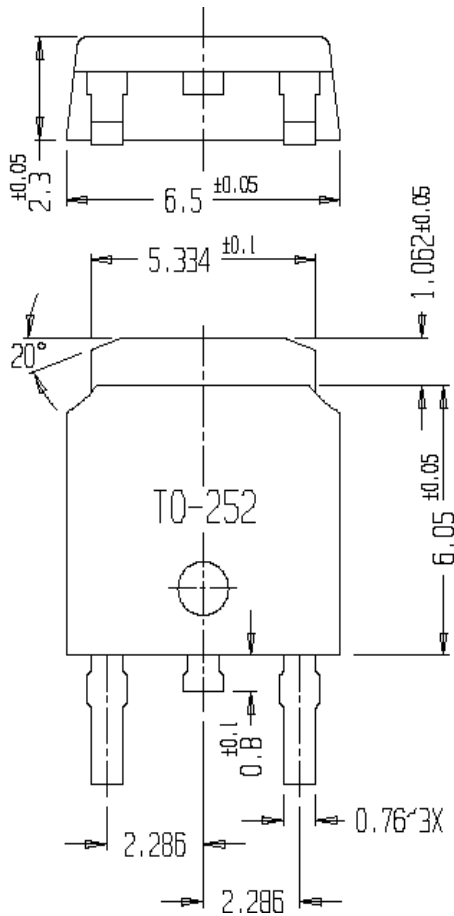
Package Dimension

TO-252



## Package Dimension

### TO-252



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