

# MT30036S

N-Channel Power MOSFET  
30 V, 90 A, 3.6 mΩ

## Features

- Typ  $R_{DS(on)} = 3.6\text{m}\Omega$  at  $V_{GS} = 10\text{V}, I_D = 18\text{A}$
- High performance trench technology for extremely low  $R_{DS(on)}$
- High power and current handling capability

## General Description

This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low  $R_{DS(ON)}$  and fast switching speed.

## Applications

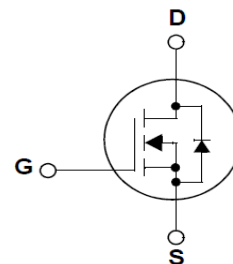
- DC-DC primary bridge
- DC-DC Synchronous rectification
- Power Management for Inverter Systems



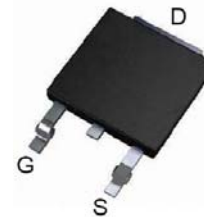
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## Simplified Schematic



## MARKING DIAGRAM & PIN ASSIGNMENT



TO-252-2L

## Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
<b>Common Ratings</b> ( $T_A = 25^\circ\text{C}$ Unless Otherwise Noted)			
$V_{DSS}$	Drain-Source Voltage	30	V
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	
$T_J$	Maximum Junction Temperature	150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$I_S$	Diode Continuous Forward Current	$T_C = 25^\circ\text{C}$ 90	A
<b>Mounted on Large Heat Sink</b>			
$I_{DM}$	Pulsed Drain Current *	280	A
$I_D$	Continuous Drain Current	$T_C = 25^\circ\text{C}$ 90	A
		$T_C = 100^\circ\text{C}$ 60	
$P_D$	Maximum Power Dissipation	$T_C = 25^\circ\text{C}$ 45	W
		$T_C = 100^\circ\text{C}$ 30	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	1.2	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	30.5	
<b>Avalanche Ratings</b>			
$E_{AS}$	Avalanche Energy, Single Pulsed	$L = 0.5\text{mH}$ 175 ***	mJ

## Electrical Characteristics (T<sub>A</sub> = 25°C Unless Otherwise Noted)

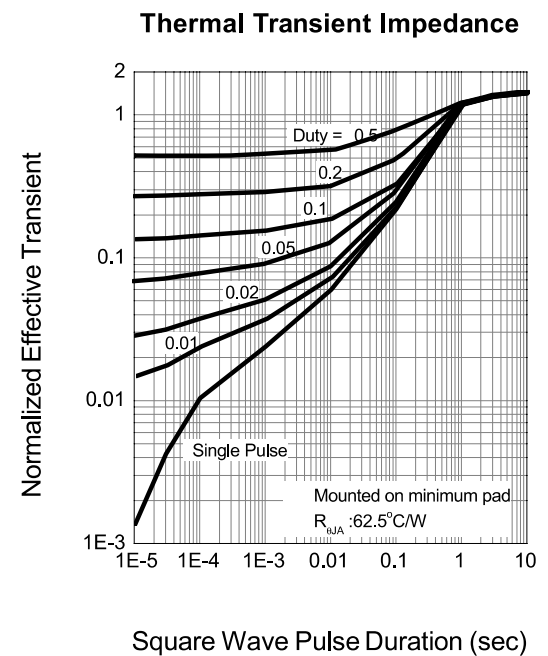
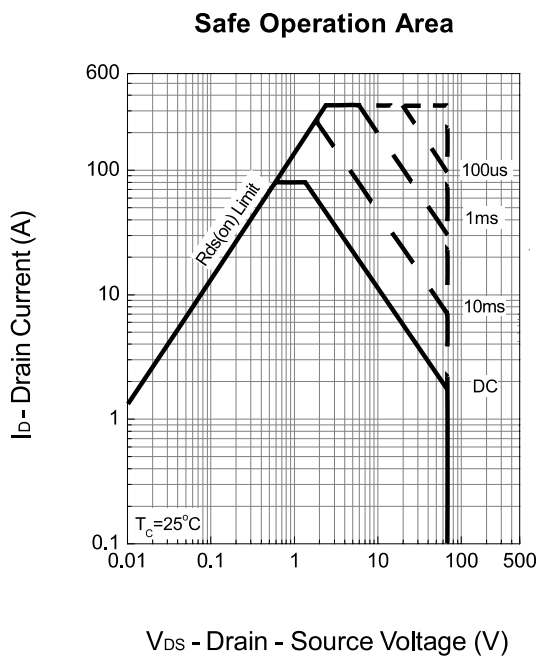
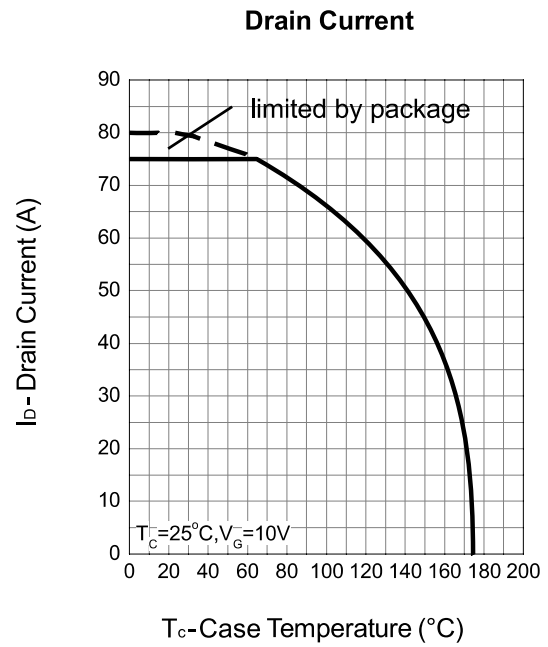
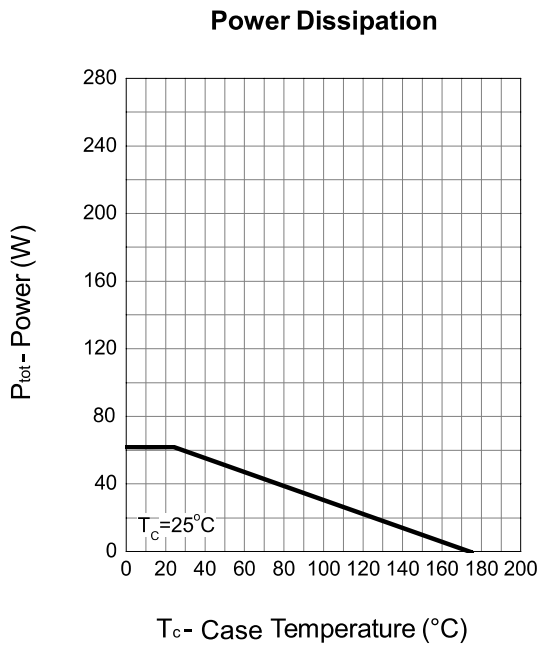
Symbol	Parameter	Test Conditions				Unit
			Min.	Typ.	Max.	
<b>Static Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>DS</sub> =250μA	30	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V T <sub>J</sub> =85°C	-	-	1	μA
			-	-	10	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA	1	1.5	3	V
I <sub>GSS</sub>	Gate Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
R <sub>DS(ON)*</sub>	Drain-Source On-state Resistance	V <sub>GS</sub> =10V, I <sub>DS</sub> =30A	-	3.6	4.8	mΩ
<b>Diode Characteristics</b>						
V <sub>SD*</sub>	Diode Forward Voltage	I <sub>SD</sub> =30A, V <sub>GS</sub> =0V	-	0.8	1.3	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>SD</sub> =30A, dI <sub>SD</sub> /dt=100A/μs	-	35	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge		-	65	-	nC

## Electrical Characteristics (Cont.) ( $T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Conditions				Unit
			Min.	Typ.	Max.	
<b>Dynamic Characteristics</b>						
$R_G$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	-	1.9	-	$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=15V,$ Frequency=1.0MHz	-	2060	-	pF
$C_{oss}$	Output Capacitance		-	255	-	
$C_{rss}$	Reverse Transfer Capacitance		-	215	-	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=15V, R_G=3\ \Omega,$ $I_{DS}=30A, V_{GS}=10V,$	-	9	-	ns
$T_r$	Turn-on Rise Time		-	15	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	36	-	
$T_f$	Turn-off Fall Time		-	11	-	
<b>Gate Charge Characteristics</b>						
$Q_g$	Total Gate Charge	$V_{DS}=15V, V_{GS}=10V,$ $I_{DS}=30A$	-	42	-	nC
$Q_{gs}$	Gate-Source Charge		-	9	-	
$Q_{gd}$	Gate-Drain Charge		-	10	-	

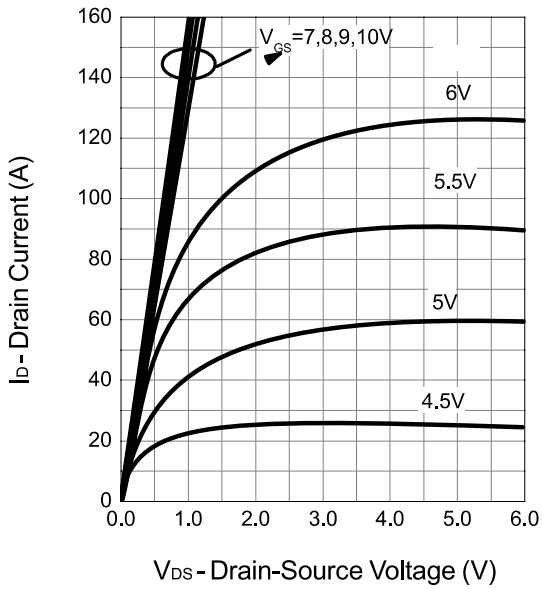
Note \* : Pulse test ; pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$ .

## Typical Operating Characteristics

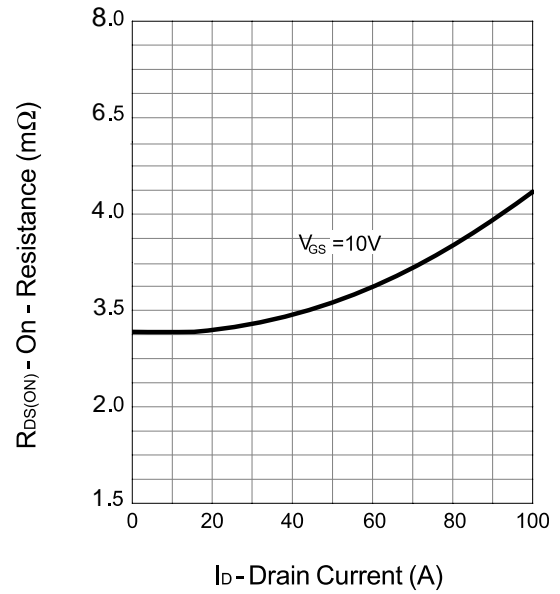


## Typical Operating Characteristics (Cont.)

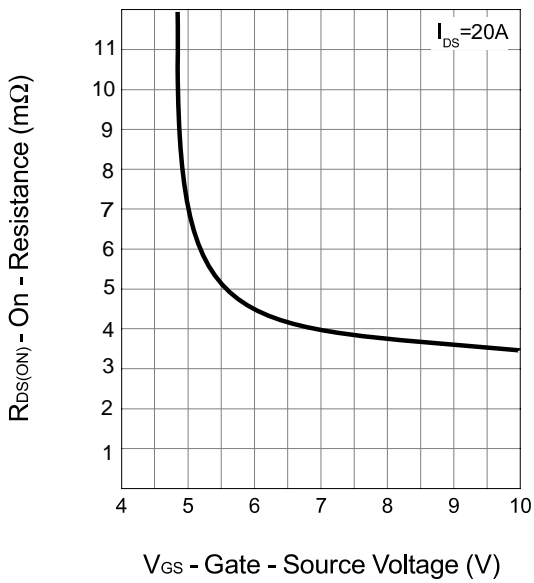
Output Characteristics



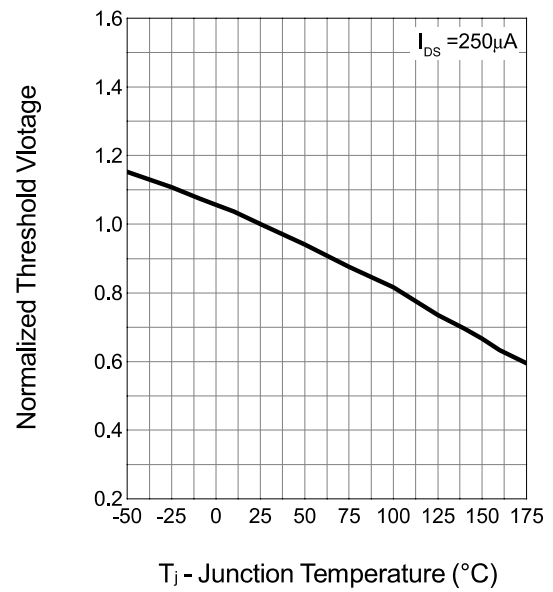
Drain-Source On Resistance



Drain-Source On Resistance

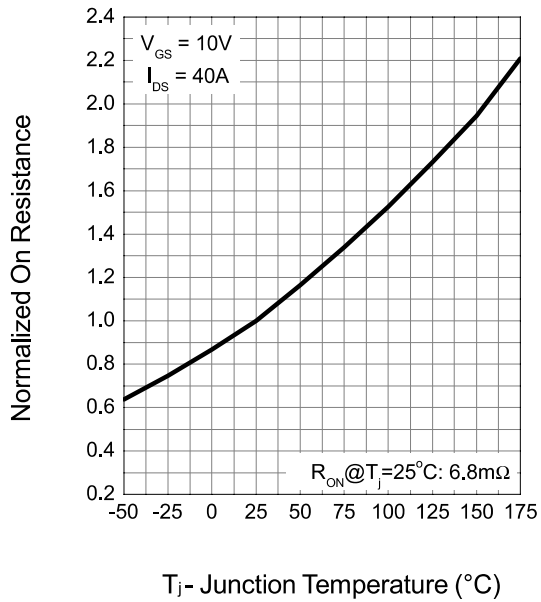


Gate Threshold Voltage

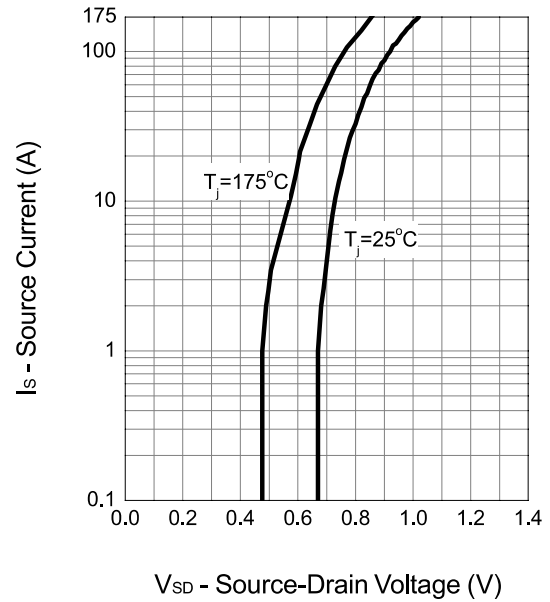


## Typical Operating Characteristics (Cont.)

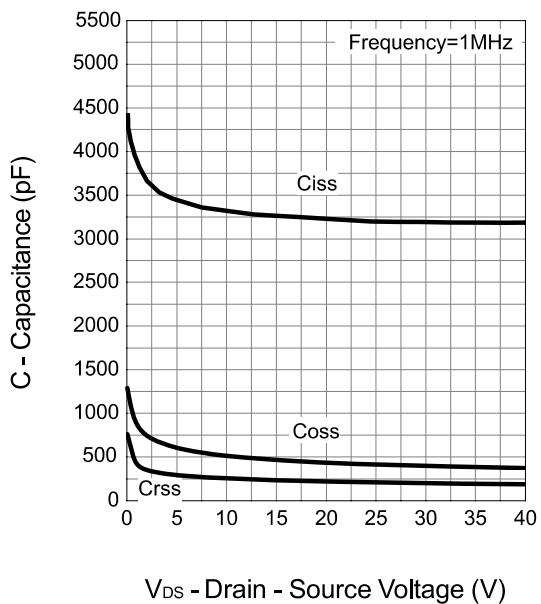
**Drain-Source On Resistance**



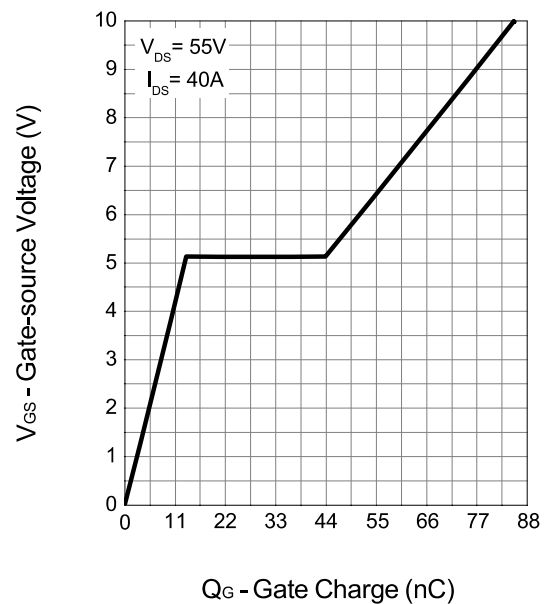
**Source-Drain Diode Forward**



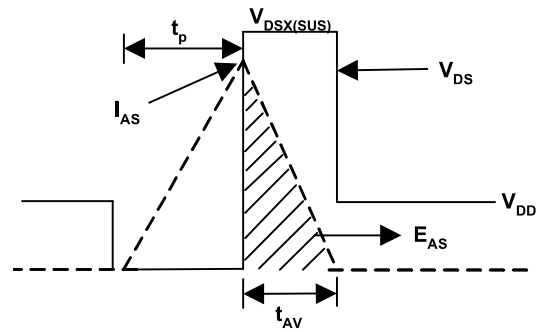
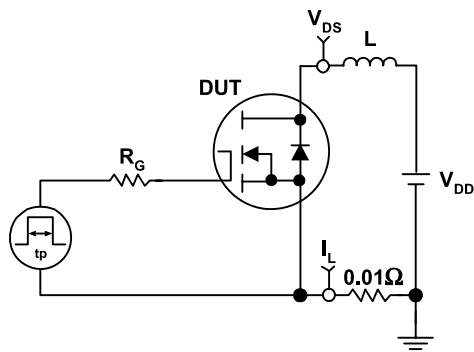
**Capacitance**



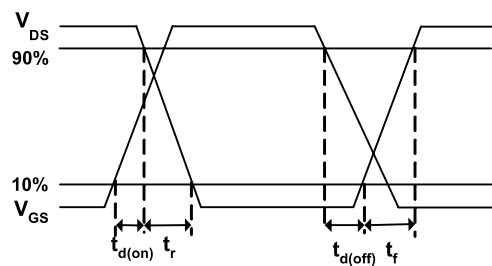
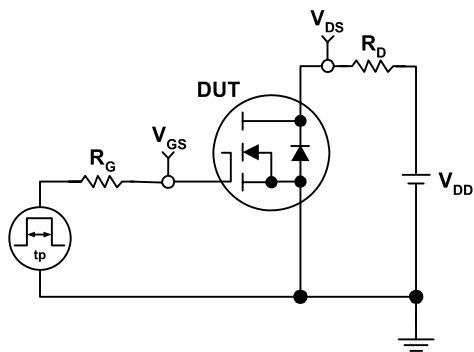
**Gate Charge**



## Avalanche Test Circuit and Waveforms

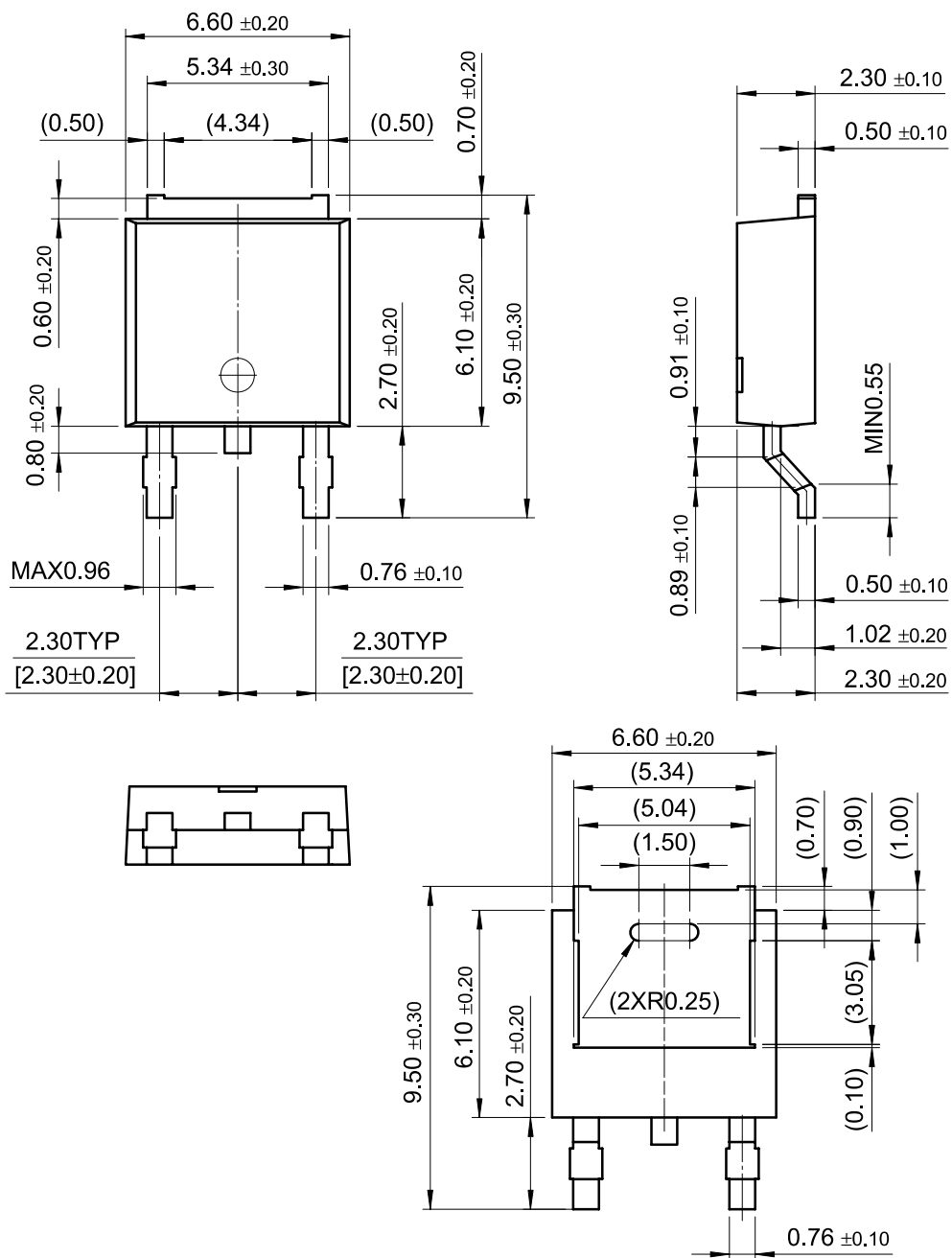


## Avalanche Test Circuit and Waveforms



Package Dimensions

TO-252-2L



Dimensions in Millimeters



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