

MT1003

N-Channel Power MOSFET

25V, 60A, 7.5mΩ



MT Semiconductor®

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Features

- Max $R_{DS(on)} = 7.5\text{ m}\Omega$ at $V_{GS} = 10\text{V}$, $I_D = 22\text{A}$
- Fast Switching Speed
- Low Gate Charge
- High Performance Trench Technology for Extremely Low $R_{DS(on)}$
- High Power and Current Handling Capability
- RoHS Compliant

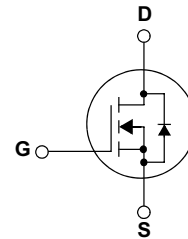
General Description

This N-Channel MOSFET is produced using MOS-TECH Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

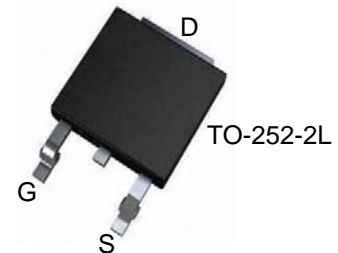
Applications

- DC-DC primary bridge
- DC-DC Synchronous rectification
- Hot swap

Simplified Schematic



MARKING DIAGRAM & PIN ASSIGNMENT



MOSFET Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Rating	Unit
Common Ratings ($T_C = 25^\circ\text{C}$ Unless Otherwise Noted)			
V_{DSS}	Drain-Source Voltage	25	V
V_{GSS}	Gate-Source Voltage	± 12	
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	$T_C = 25^\circ\text{C}$ 60	A
Mounted on Large Heat Sink			
I_{DM}		$T_C = 25^\circ\text{C}$ 180	A
I_D	Continuous Drain Current	$T_C = 25^\circ\text{C}$ 60	A
		$T_C = 100^\circ\text{C}$ 31	
P_D	Maximum Power Dissipation	$T_C = 25^\circ\text{C}$ 36	W
		$T_C = 100^\circ\text{C}$ 14.7	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	3.4	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	62.5	$^\circ\text{C}/\text{W}$
E_{AS}	Drain-Source Avalanche Energy	$L = 0.5\text{mH}$ 70***	mJ

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
MT1003	MT1003	TO-252-2L	-	-	2500

Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

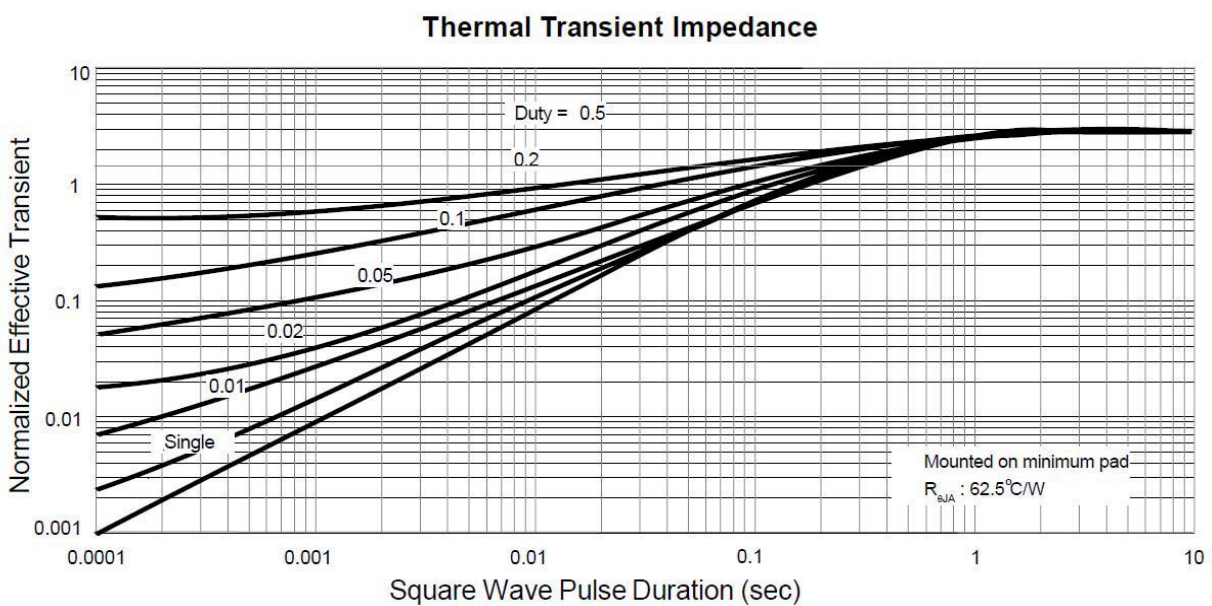
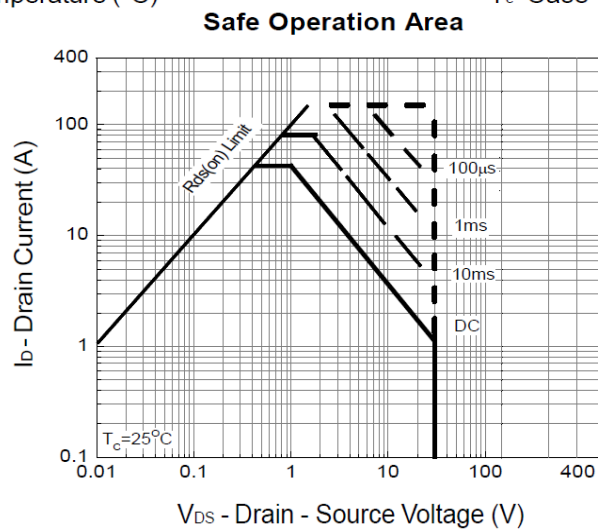
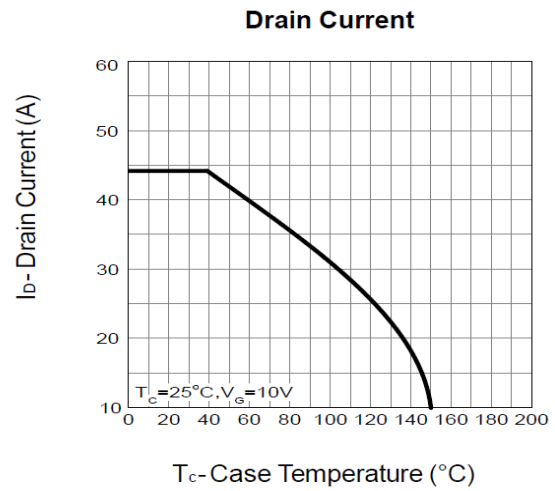
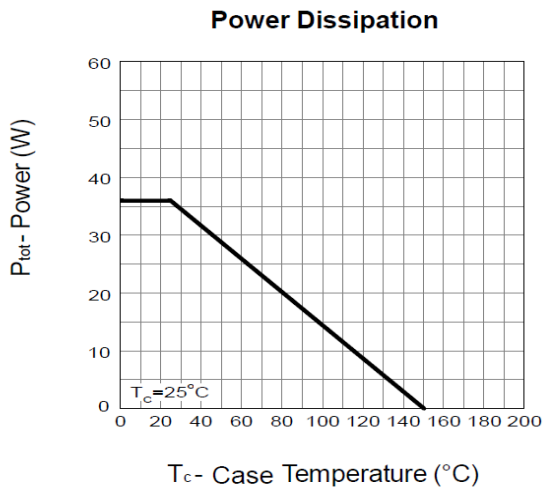
Symbol	Parameter	Test Conditions				Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	25	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=30V, V_{GS}=0V$ $T_J=85^\circ\text{C}$	-	-	1	μA
			-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	1.0	1.6	2.5	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
$R_{DS(ON)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=22A$	-	7.5	8	$m\Omega$
Diode Characteristics						
V_{SD}	Diode Forward Voltage	$I_{SD}=22A, V_{GS}=0V$	-	0.8	1.1	V
t_{rr}	Reverse Recovery Time	$I_{DS}=22A, di_{SD}/dt=100A/\mu s$	-	21	-	ns
Q_{rr}	Reverse Recovery Charge		-	13	-	nC

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

Symbol	Parameter	Test Conditions				Unit
			Min.	Typ.	Max.	
Dynamic Characteristics						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	-	2.9	-	Ω
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=15V,$ Frequency=1.0MHz	-	1062	-	pF
C_{oss}	Output Capacitance		-	250	-	
C_{riss}	Reverse Transfer Capacitance		-	122	-	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=15V, R_G=3\Omega,$ $I_{DS}=22A, V_{GS}=10V,$	-	15	28	ns
T_r	Turn-on Rise Time		-	13	24	
$t_{d(OFF)}$	Turn-off Delay Time		-	20	35	
T_f	Turn-off Fall Time		-	10	19	
Gate Charge Characteristics						
Q_g	Total Gate Charge	$V_{DS}=24V, V_{GS}=10V,$ $I_{DS}=22A$	-	29	-	nC
Q_{gs}	Gate-Source Charge		-	4.7	-	
Q_{gd}	Gate-Drain Charge		-	4.3	-	

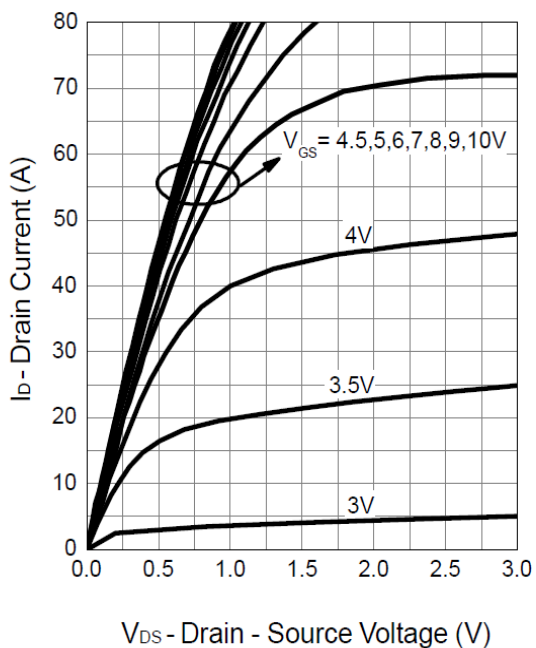
Note * : Pulse test ; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

Typical Operating Characteristics

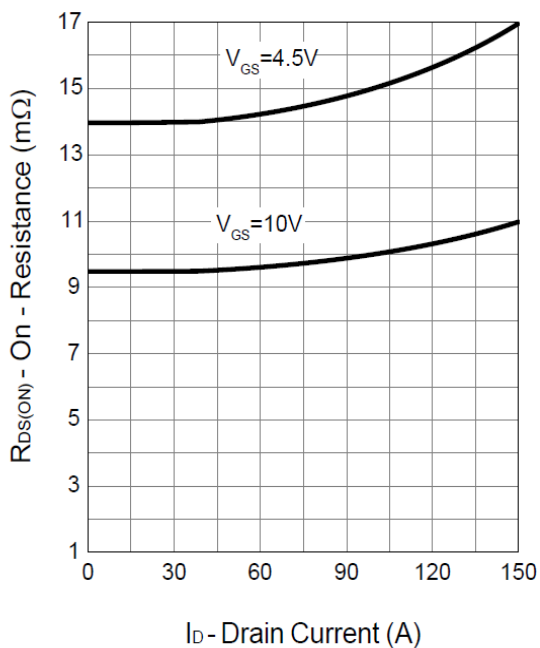


Typical Operating Characteristics (Cont.)

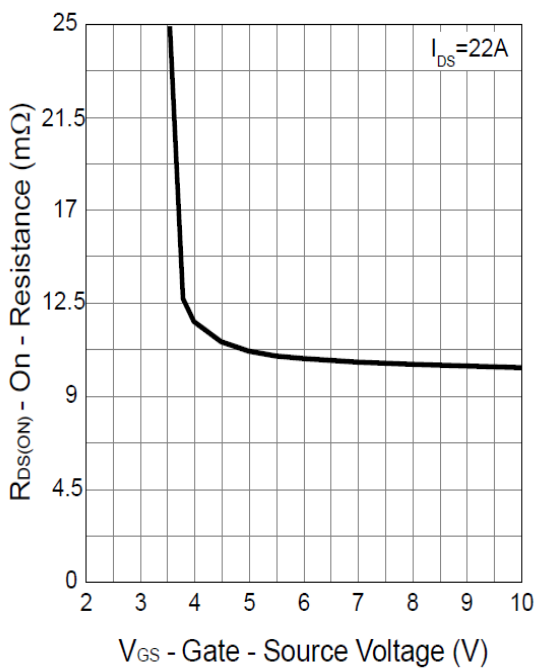
Output Characteristics



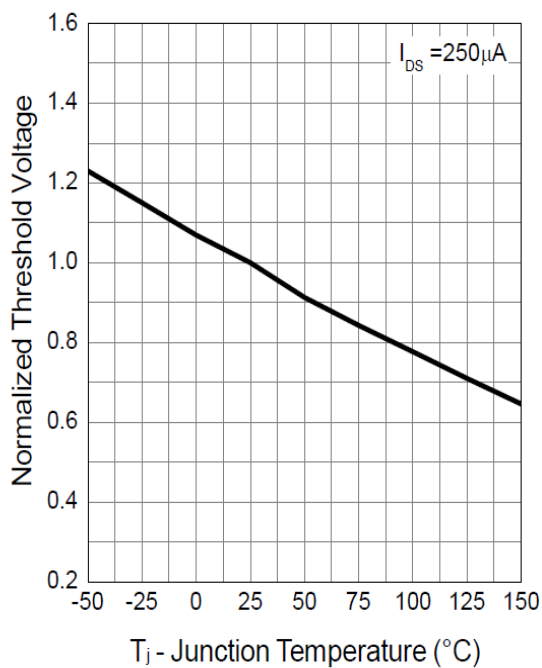
Drain-Source On Resistance



Gate-Source On Resistance

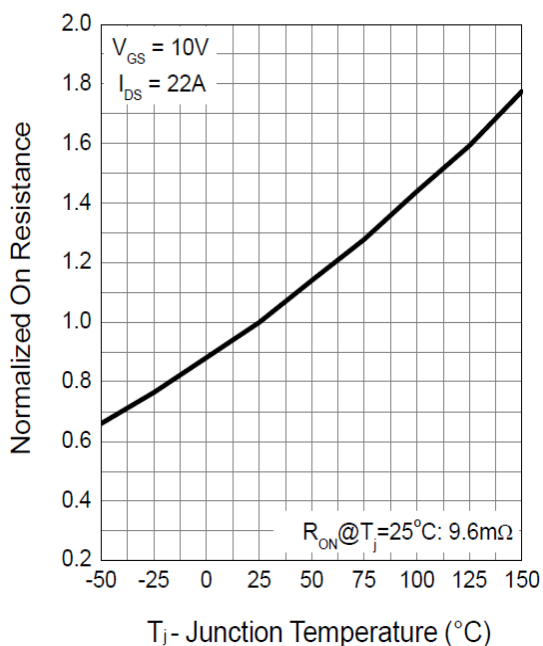


Gate Threshold Voltage

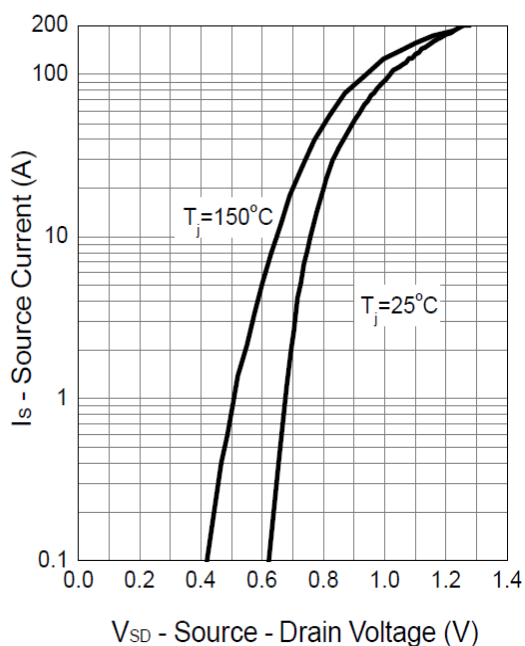


Typical Operating Characteristics (Cont.)

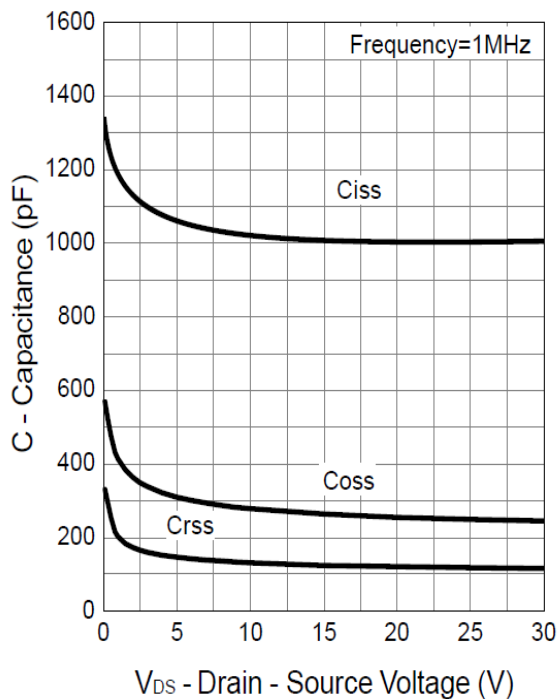
Drain-Source On Resistance



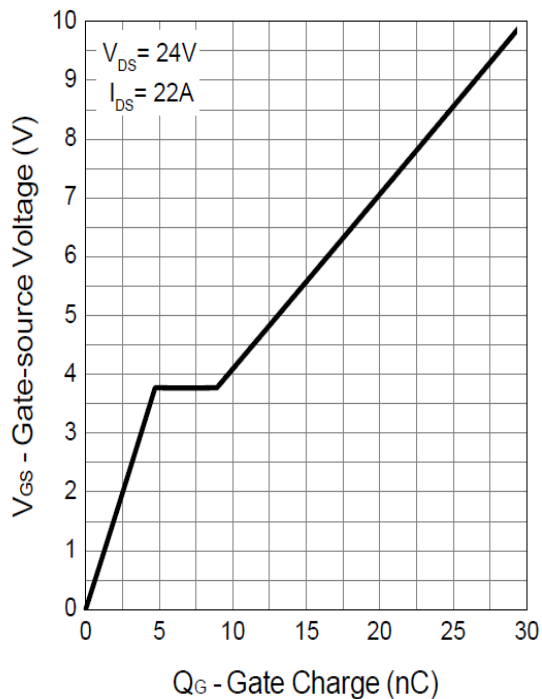
Source-Drain Diode Forward



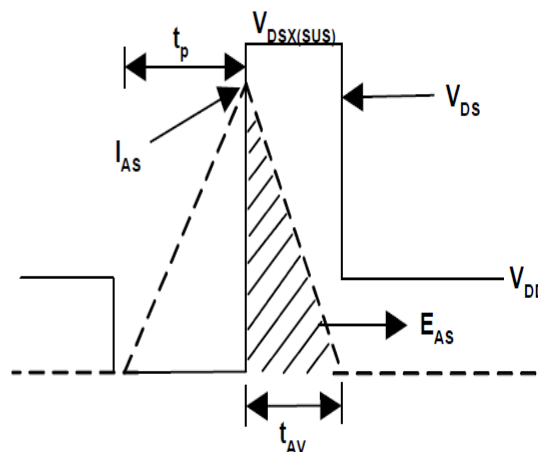
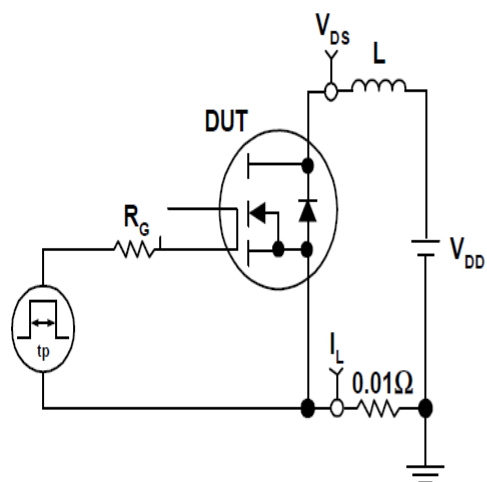
Capacitance



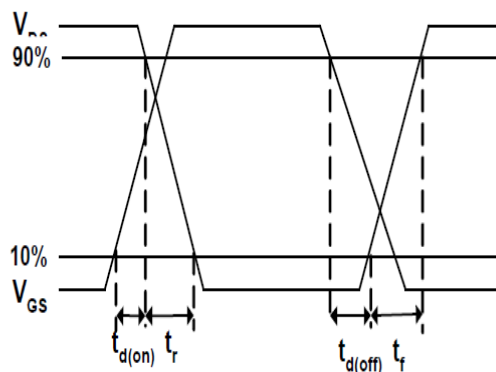
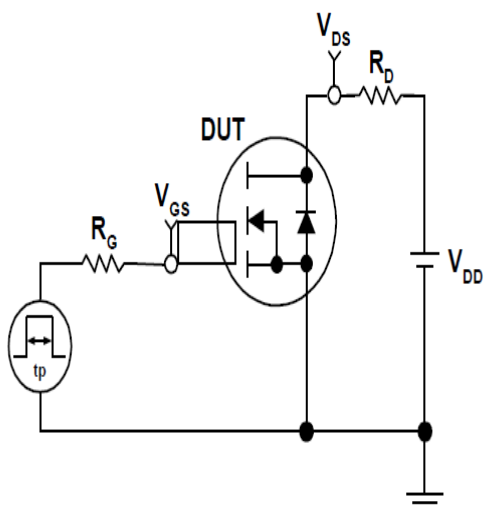
Gate Charge



Avalanche Test Circuit and Waveforms

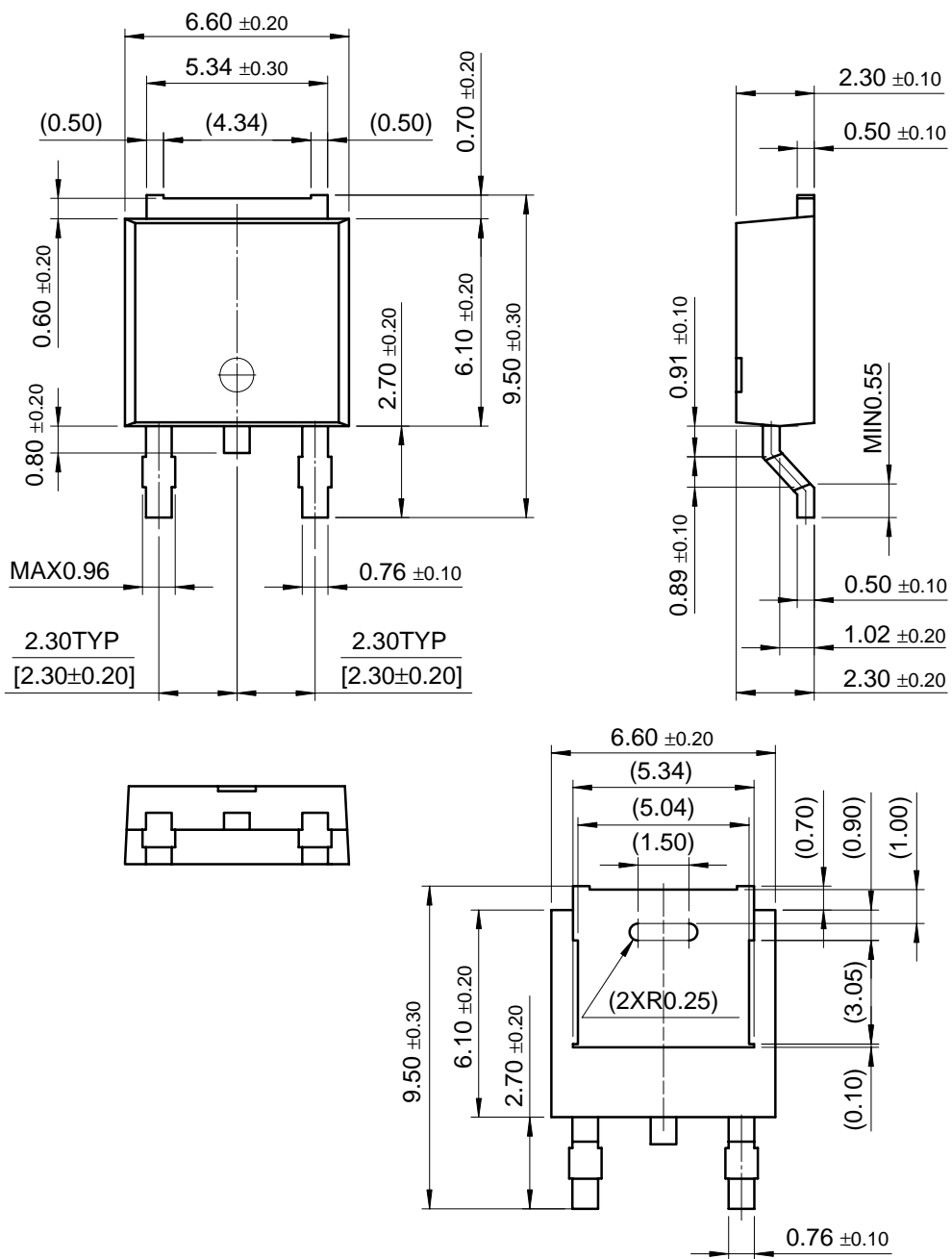


Switching Time Test Circuit and Waveforms



Package Dimensions

TO-252-2L



Dimensions in Millimeters

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