MT3205S

N-Channel Power ®MOSFET
55V, 80A, 6.1mΩ

MT Semiconductor®

http://www.mtsemi.com

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.

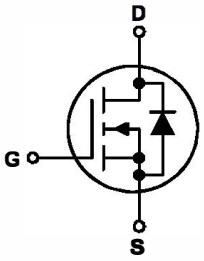
Features

- $R_{DS(on)}$ = 6.1mΩ(Typ.)@ V_{GS}= 10V, I_D= 40A
- High performance trench technology for extremely low $R_{DS(ON)}$
- High power and current handling capability
- RoHS compliant

Applications

- DC/DC converters

Simplified Schematic



MARKING DIAGRAM
& PIN ASSIGNMENT

Absolute Maximum Ratings (T_A = 25℃ unless otherwise noted)

Symbol	Parameter			Ratings	Units
V_{DSS}	Drain to Source Voltage			55	V
V_{GSS}	Gate to Source Voltage			±20	V
I_D	Drain Current	-Continuous (T_C = 25°C)	(Note 1)	80	A
I_{DM}	Drain Current	- Pulsed		240	A
E_{AS}	Single Pulsed Avalanche Energy		(Note 2)	365	mJ
P_D	Power Dissipation	(T_C = 25°C)		50	W
		- Derate above 25°C		1.0	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range			-55 to +150	°C

Thermal Characteristics

Symbol	Parameter	Ratings	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.75	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	40	

Package Marking and Ordering Information T_C = 25°C unless otherwise noted

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
MT3205S	MT3205S	TO-252-2L	-	-	2500 units

Electrical Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V, T_J = 25°C	55	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 44V, V_{GS} = 0V	-	-	25	μA
		V_{DS} = 44V, T_C = 150°C	-	-	250	
I_{GSS}	Gate to Body Leakage Current	V_{GS} = ±20V, V_{DS} = 0V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	VGS = VDS, ID = 250μA	2		4	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10V, I_D = 59A	-	6.1	7.2	mΩ
		V_{GS} = 10V, I_D = 59A, T_J = 175°C	-	12	-	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz	-	2810	3730	pF
C_{oss}	Output Capacitance		-	450	630	pF
C_{rss}	Reverse Transfer Capacitance		-	250	375	pF
R_G	Gate Resistance	V_{GS} = 0V, f = 1MHz	3	4	5	Ω
$Q_{g(tot)}$	Total Gate Charge at 10V	V_{GS} = 0V to 10V; V_{DS} = 44V, I_D = 59A, I_g = 1mA	-	93	120	nC
$Q_{g(th)}$	Threshold Gate Charge	V_{GS} = 0V to 2V; V_{DS} = 44V, I_D = 59A, I_g = 1mA	-	25.5	33	nC
Q_{gs}	Gate to Source Gate Charge	V_{DS} = 44V, I_D = 59A, I_g = 1mA	-	35	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau			9.5	-	nC
Q_{gd}	Gate to Drain “Miller” Charge		-	32	-	nC
Switching Characteristics						
t_{ON}	Turn-On Time	V_{DD} = 28V, I_D = 59A, V_{GS} = 10V, R_{GEN} = 2.5Ω	-	97	110	ns
$t_{d(on)}$	Turn-On Delay Time		-	13	25	ns
t_r	Turn-On Rise Time		-	107	205	ns
$t_{d(off)}$	Turn-Off Delay Time		-	42	60	ns
t_f	Turn-Off Fall Time		-	18	46	ns
t_{OFF}	Turn-Off Time		-	60	83	ns
Drain-Source Diode Characteristics						
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_{SD} = 59A	-	-	1.3	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, I_{SD} = 59A, dI_F/dt = 100A/μs	-	43.3	-	ns
Q_{rr}	Reverse Recovery Charge		-	70.8	-	nC

Notes:
1: Calculated continuous current based on maximum allowable junction temperature. Package limited to 75A continuous, see Figure 9.
2: L = 0.21mH, I_{AS} = 59A, V_{DD} = 50V, V_{GS} = 10V, R_G = 25Ω, Starting T_J = 25°C

Typical Performance Characteristics

Figure 1. On-Region Characteristics

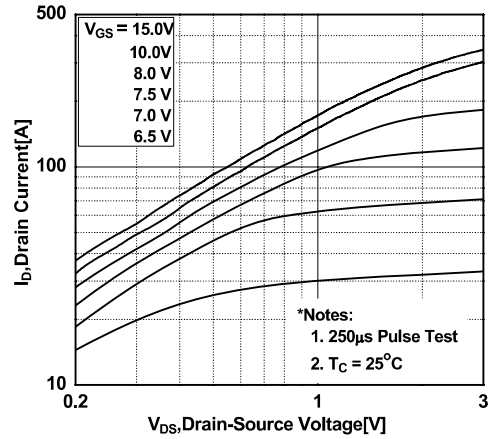


Figure 2. Transfer Characteristics

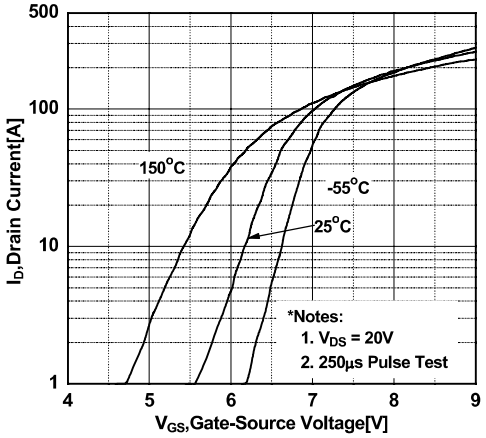


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

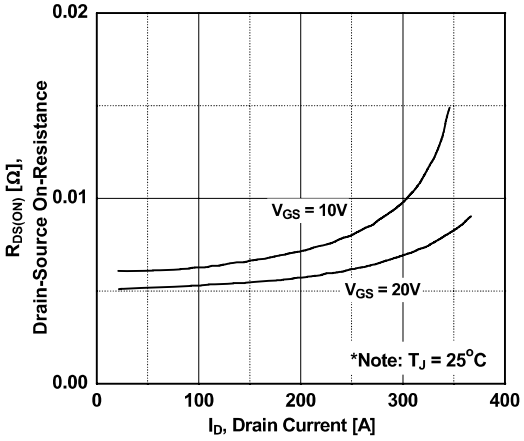


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

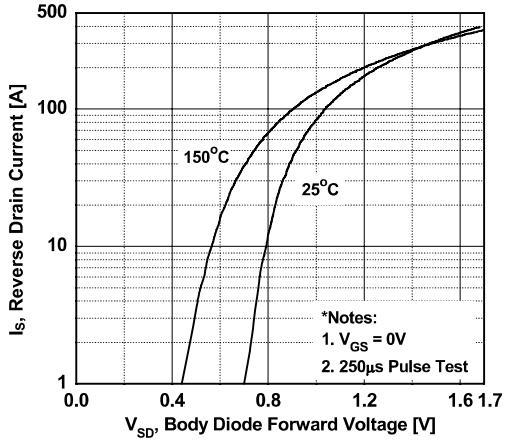


Figure 5. Capacitance Characteristics

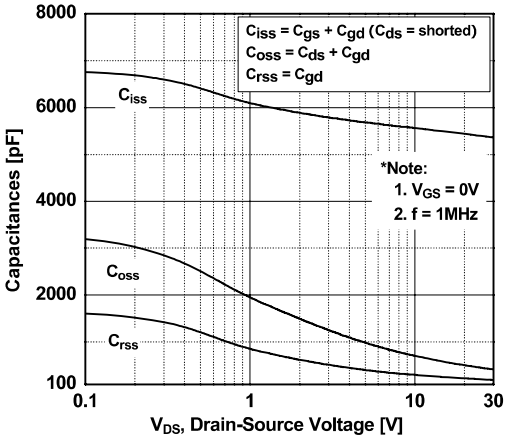
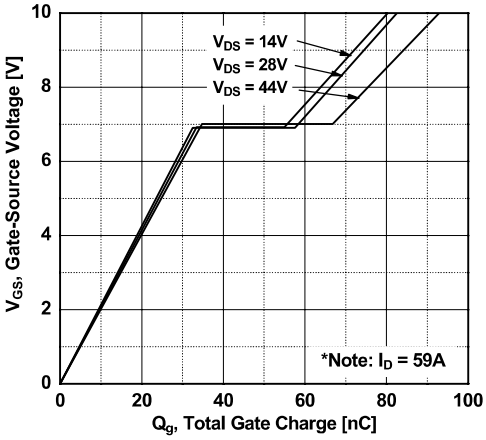


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

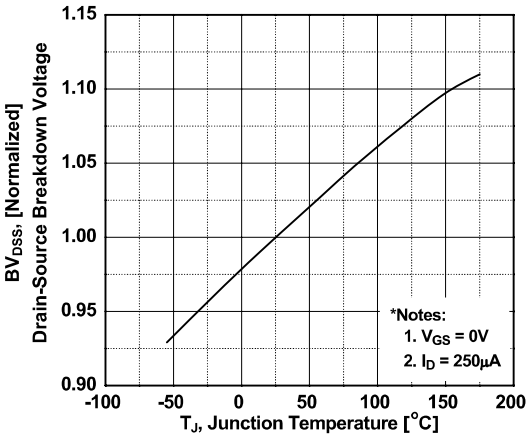


Figure 8. On-Resistance Variation vs. Temperature

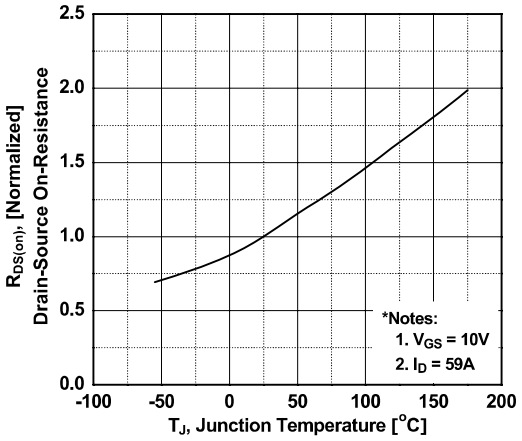


Figure 9. Maximum Safe Operating Area

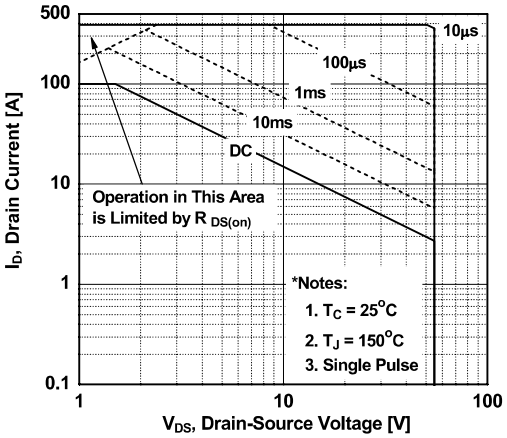


Figure 10. Maximum Drain Current vs. Case Temperature

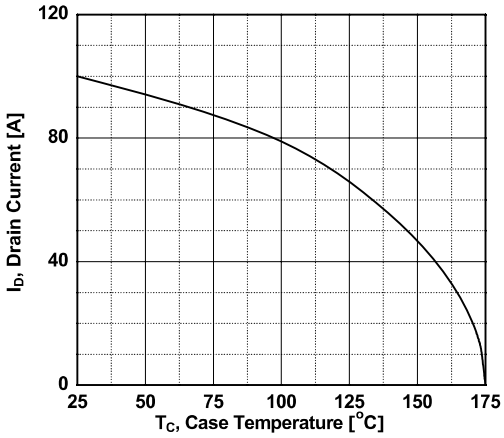
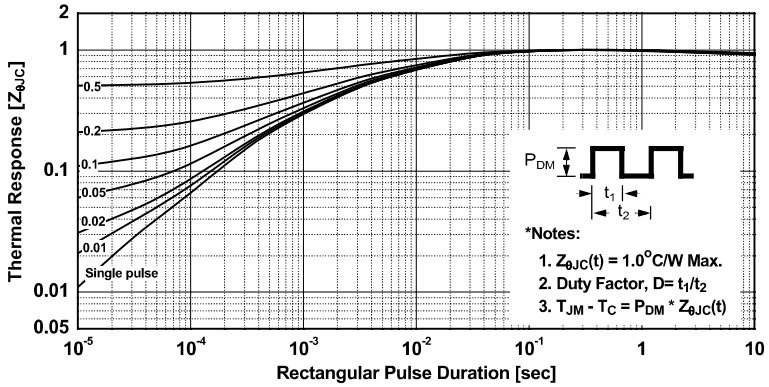
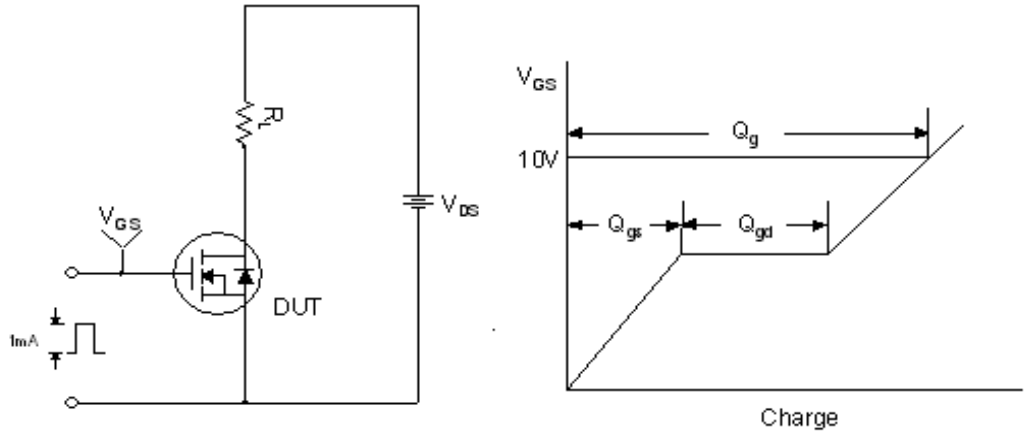


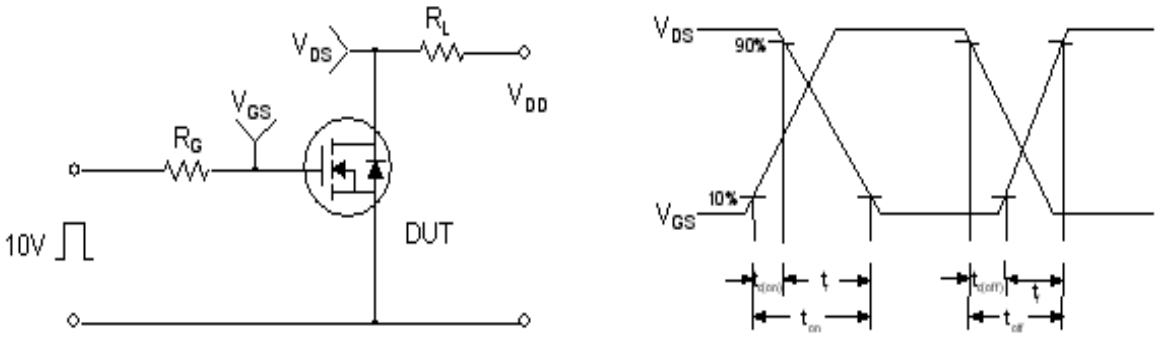
Figure 11. Transient Thermal Response Curve



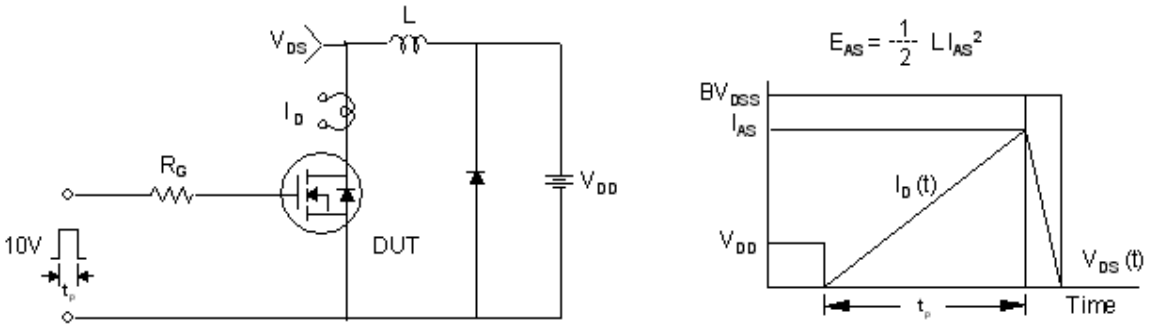
Gate Charge Test Circuit & Waveform



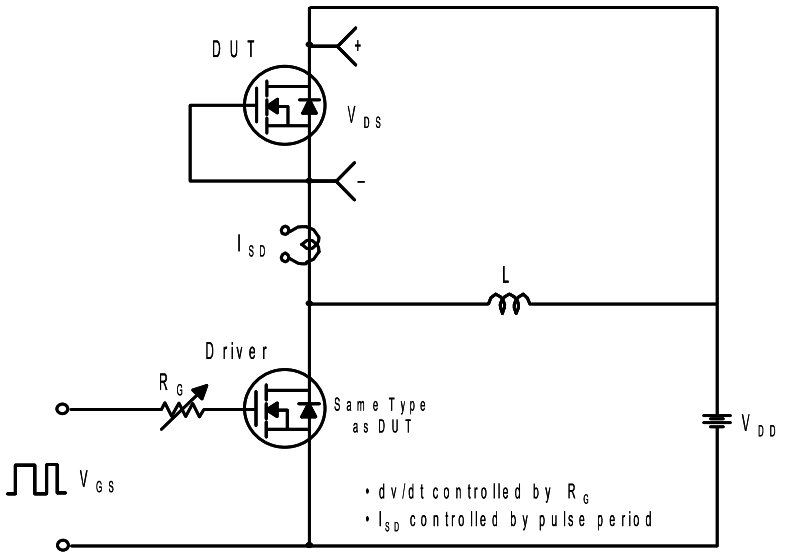
Resistive Switching Test Circuit & Waveforms

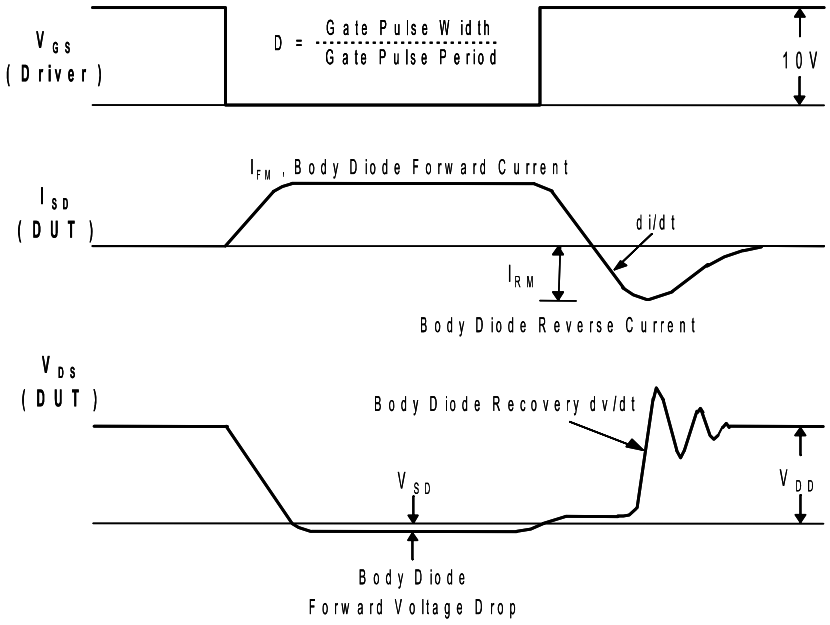


Unclamped Inductive Switching Test Circuit & Waveforms



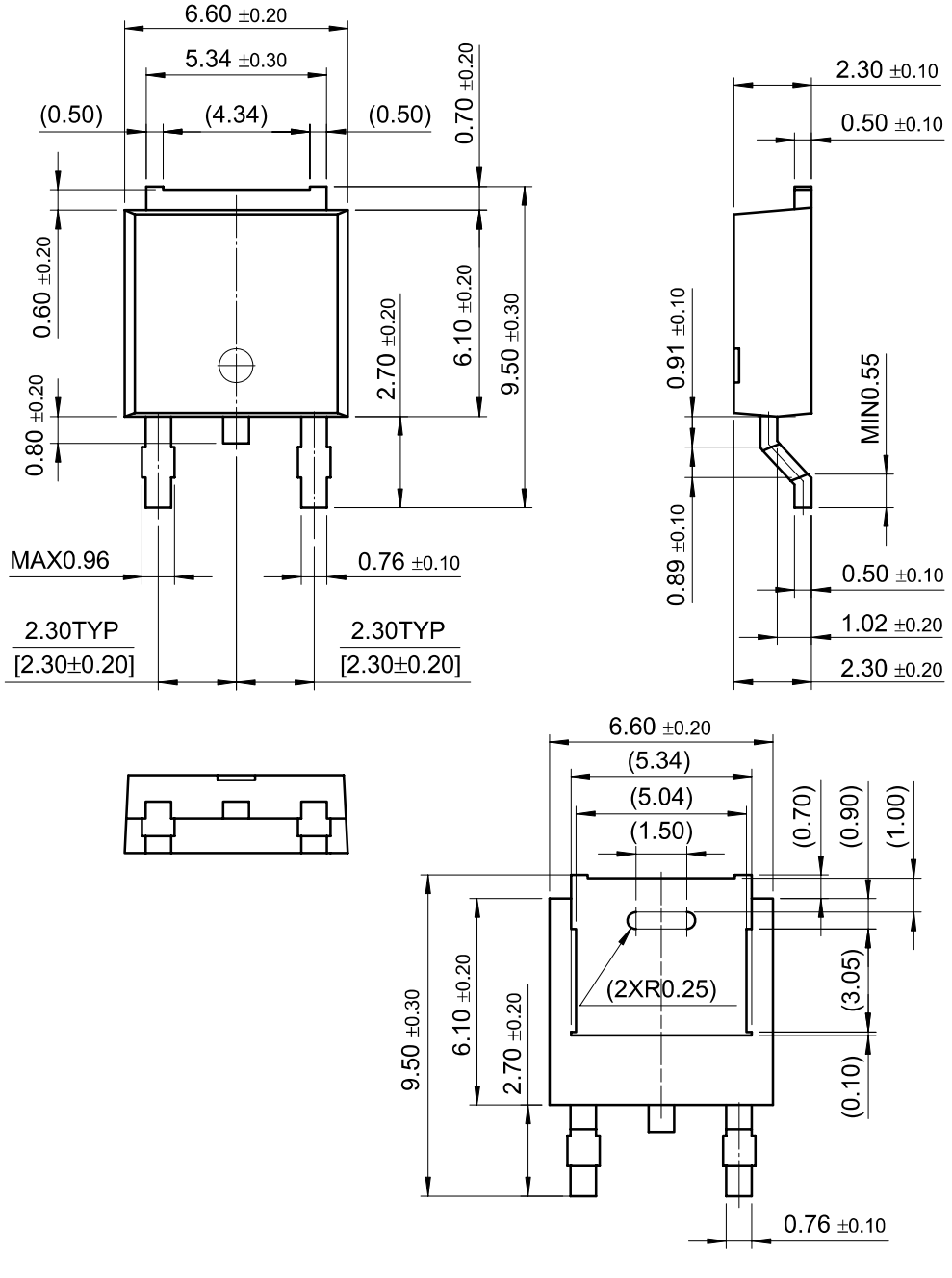
Peak Diode Recovery dv/dt Test Circuit & Waveforms





Package Dimensions

TO-252-2L



Dimensions in Millimeters

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