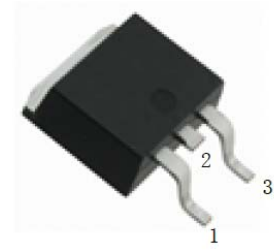
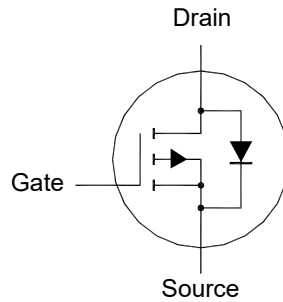


WTR02P100US-HAF

P-Channel Enhancement Mode MOSFET

Features

- Halogen and Antimony Free(HAF), RoHS compliant



1.Gate 2.Drain 3.Source
TO-252 Plastic Package

Key Parameters

Parameter	Value	Unit
$-BV_{DSS}$	20	V
$R_{DS(ON)}$ Max	10 @ $-V_{GS} = 10$ V	m Ω
	13 @ $-V_{GS} = 4.5$ V	
$-V_{GS(th)}$ typ	0.8	V
Q_g typ	102 @ $-V_{GS} = 10$ V	nC

Absolute Maximum Ratings (at $T_a = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$-V_{DS}$	20	V
Gate-Source Voltage	V_{GS}	± 12	V
Drain Current	$-I_D$	$T_c = 25^\circ\text{C}$	65
		$T_c = 100^\circ\text{C}$	40.9
Peak Drain Current, Pulsed ¹⁾	$-I_{DM}$	180	A
Single-Pulse Avalanche Current	$-I_{AS}$	33	A
Single-Pulse Avalanche Energy ²⁾	E_{AS}	54	mJ
Power Dissipation	P_D	48	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to + 150	$^\circ\text{C}$

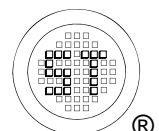
Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Case	$R_{\theta JC}$	2.6	$^\circ\text{C/W}$
Thermal Resistance from Junction to Ambient ³⁾	$R_{\theta JA}$	36	$^\circ\text{C/W}$

¹⁾ Pulse Test: Pulse Width ≤ 100 μs , Duty Cycle $\leq 2\%$, Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)} = 150^\circ\text{C}$.

²⁾ Limited by $T_{J(MAX)}$, starting $T_J = 25^\circ\text{C}$, $L = 0.1$ mH, $R_g = 25$ Ω , $-I_D = 33$ A, $-V_{GS} = 10$ V.

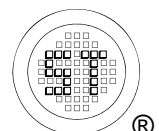
³⁾ Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate in still air.



WTR02P100US-HAF

Characteristics at $T_a = 25^\circ\text{C}$ unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit
STATIC PARAMETERS					
Drain-Source Breakdown Voltage at $-I_D = 250 \mu\text{A}$	$-BV_{DSS}$	20	-	-	V
Drain-Source Leakage Current at $-V_{DS} = 16 \text{ V}$	$-I_{DSS}$	-	-	1	μA
Gate Leakage Current at $V_{GS} = \pm 12 \text{ V}$	I_{GSS}	-	-	± 100	nA
Gate-Source Threshold Voltage at $V_{DS} = V_{GS}$, $-I_D = 250 \mu\text{A}$	$-V_{GS(th)}$	0.3	-	1	V
Drain-Source On-State Resistance at $-V_{GS} = 10 \text{ V}$, $-I_D = 15 \text{ A}$ at $-V_{GS} = 4.5 \text{ V}$, $-I_D = 8 \text{ A}$	$R_{DS(on)}$	- -	7.6 -	10 13	m Ω
DYNAMIC PARAMETERS					
Gate resistance at $V_{DS} = 0 \text{ V}$, $f = 1 \text{ MHz}$	R_g	-	2	-	Ω
Forward Transconductance at $-V_{DS} = 5 \text{ V}$, $-I_D = 8 \text{ A}$	g_{fs}	-	38.6	-	S
Input Capacitance at $-V_{DS} = 10 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$	C_{iss}	-	4596	-	pF
Output Capacitance at $-V_{DS} = 10 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$	C_{oss}	-	546	-	pF
Reverse Transfer Capacitance at $-V_{DS} = 10 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$	C_{rss}	-	449	-	pF
Total Gate Charge at $-V_{GS} = 10 \text{ V}$, $-V_{DS} = 10 \text{ V}$, $-I_D = 15 \text{ A}$ at $-V_{GS} = 4.5 \text{ V}$, $-V_{DS} = 10 \text{ V}$, $-I_D = 15 \text{ A}$	Q_g	- -	102 47	- -	nC
Gate-Source Charge at $-V_{GS} = 10 \text{ V}$, $-V_{DS} = 10 \text{ V}$, $-I_D = 15 \text{ A}$	Q_{gs}	-	9	-	nC
Gate-Drain Charge at $-V_{GS} = 10 \text{ V}$, $-V_{DS} = 10 \text{ V}$, $-I_D = 15 \text{ A}$	Q_{gd}	-	13	-	nC
Turn-On Delay Time at $-V_{DD} = 10 \text{ V}$, $-V_{GS} = 10 \text{ V}$, $-I_D = 15 \text{ A}$, $R_g = 3.3 \Omega$	$t_{d(on)}$	-	28	-	nS
Turn-On Rise Time at $-V_{DD} = 10 \text{ V}$, $-V_{GS} = 10 \text{ V}$, $-I_D = 15 \text{ A}$, $R_g = 3.3 \Omega$	t_r	-	67	-	nS
Turn-Off Delay Time at $-V_{DD} = 10 \text{ V}$, $-V_{GS} = 10 \text{ V}$, $-I_D = 15 \text{ A}$, $R_g = 3.3 \Omega$	$t_{d(off)}$	-	41	-	nS
Turn-Off Fall Time at $-V_{DD} = 10 \text{ V}$, $-V_{GS} = 10 \text{ V}$, $-I_D = 15 \text{ A}$, $R_g = 3.3 \Omega$	t_f	-	5	-	nS
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at $-I_S = 1 \text{ A}$, $V_{GS} = 0 \text{ V}$	$-V_{SD}$	-	-	1.2	V
Body-Diode Continuous Current	$-I_S$	-	-	65	A
Body-Diode Continuous Current, Pulsed	$-I_{SM}$	-	-	180	A
Body Diode Reverse Recovery Time at $-I_S = 15 \text{ A}$, $di/dt = 100 \text{ A} / \mu\text{s}$	t_{rr}	-	17	-	nS
Body Diode Reverse Recovery Charge at $-I_S = 15 \text{ A}$, $di/dt = 100 \text{ A} / \mu\text{s}$	Q_{rr}	-	7.8	-	nC



Electrical Characteristics Curves

Fig. 1 Typical Output Characteristic

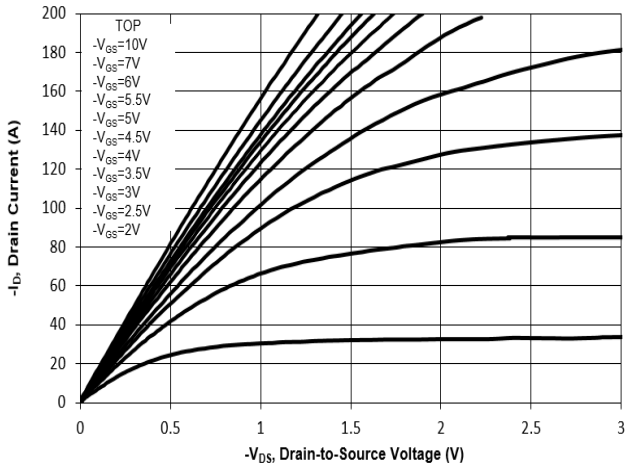


Fig. 2 Typical Transfer Characteristic

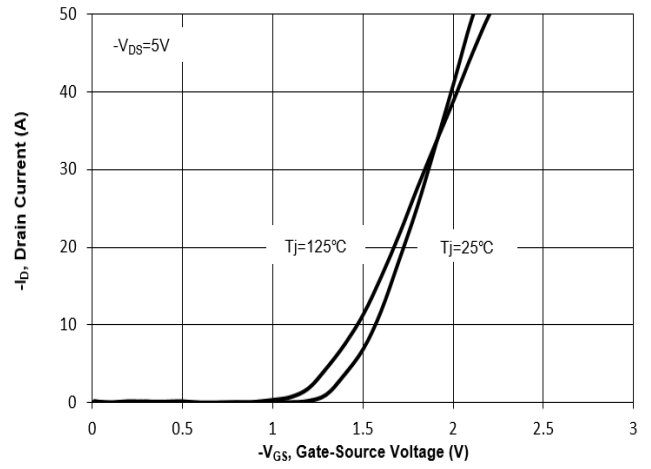


Fig. 3 on-Resistance vs. Drain Current

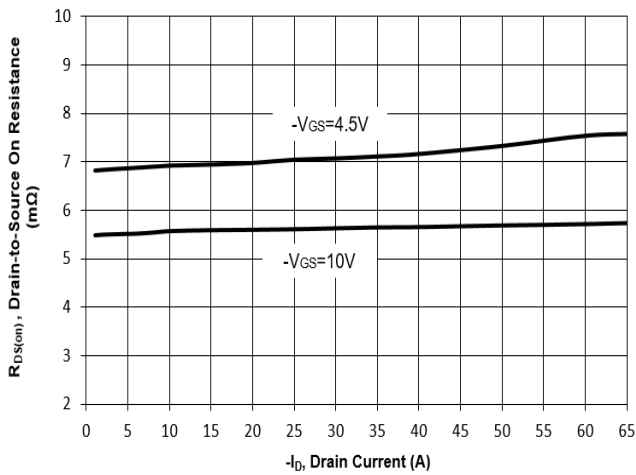


Fig. 4 on-Resistance vs. Gate Voltage

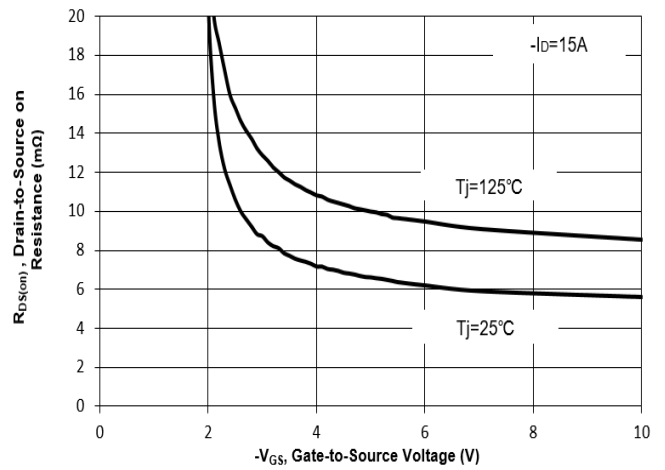


Fig. 5 on-Resistance vs. T_J

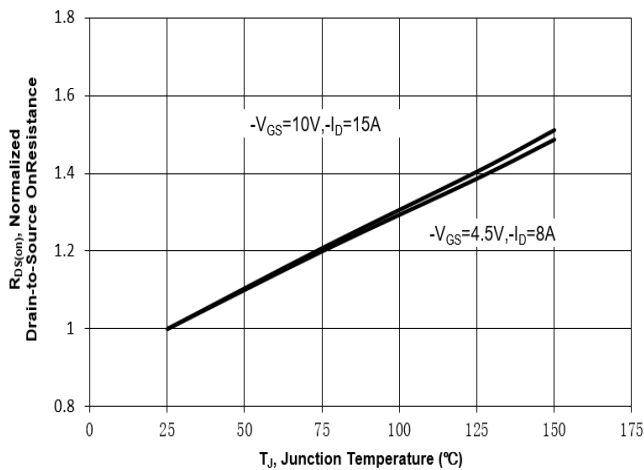
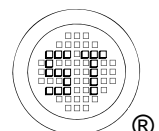
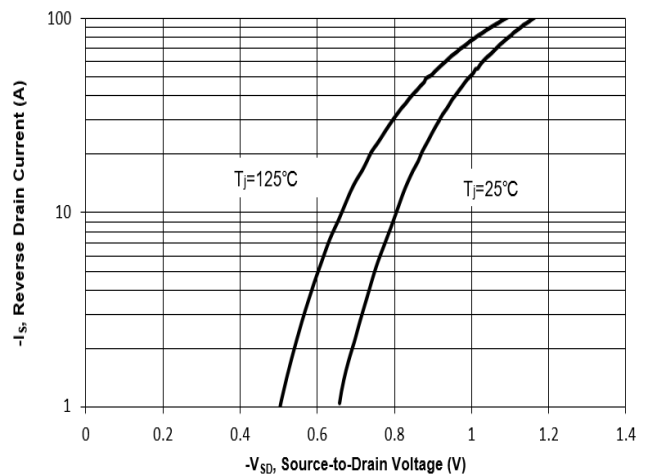


Fig. 6 Typical Body-Diode Forward Characteristic



Electrical Characteristics Curves

Fig. 7 Typical Junction Capacitance

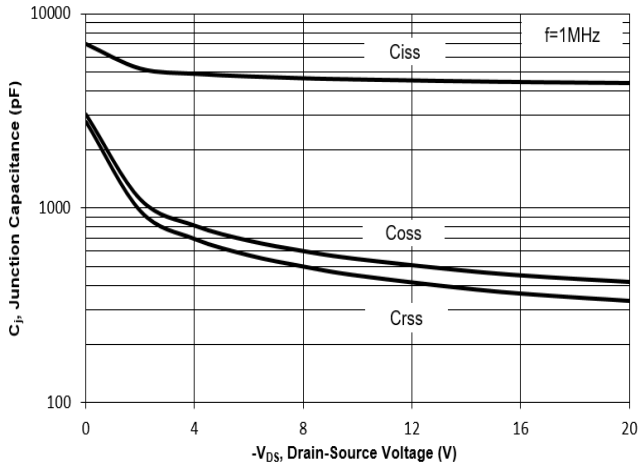


Fig. 8 Drain-Source Leakage Current vs. T_j

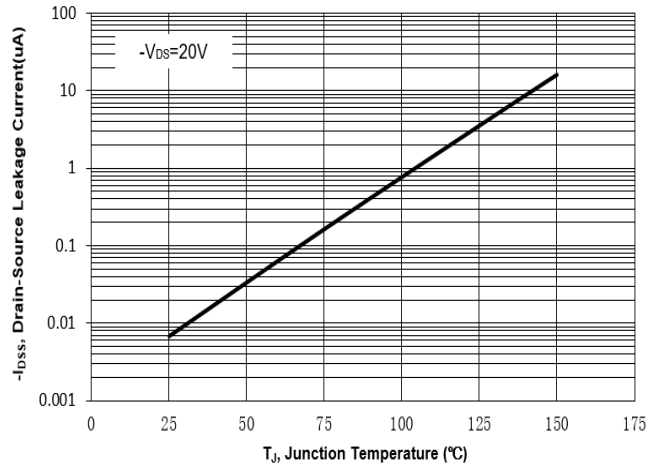


Fig. 9 $V_{(BR)DSS}$ vs. Junction Temperature

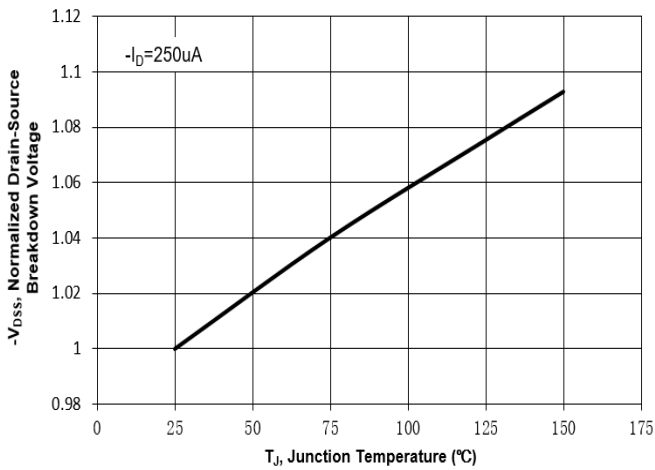


Fig. 10 Gate Threshold Variation vs. T_j

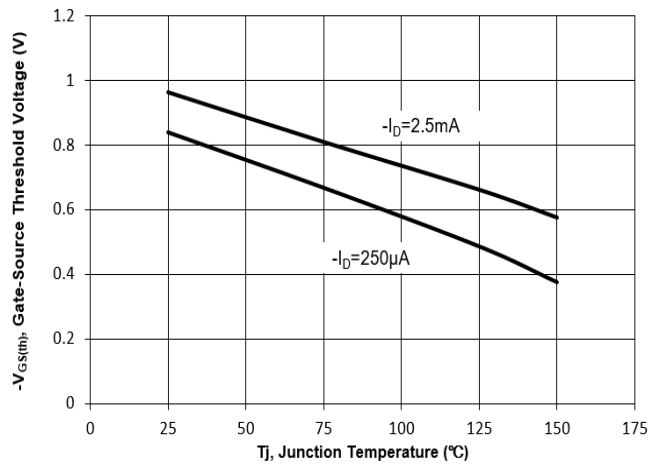


Fig. 11 Gate Charge

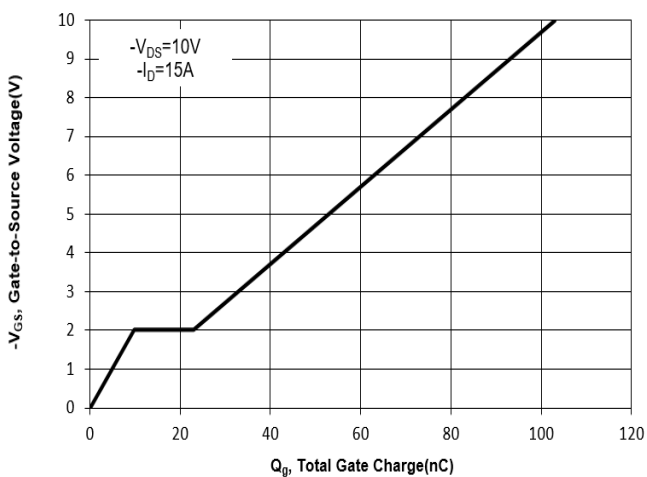
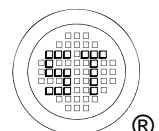
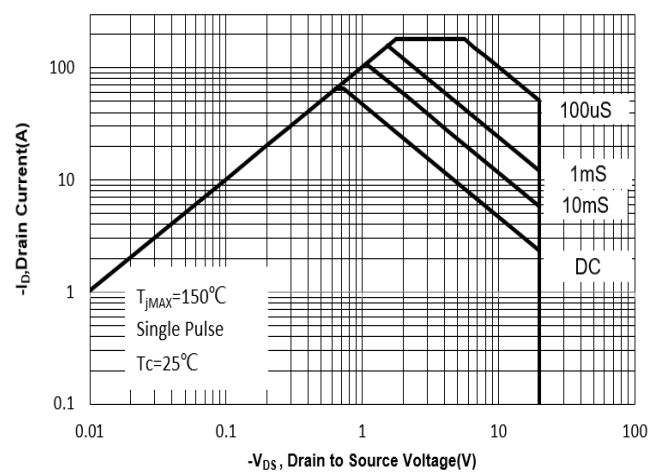


Fig. 12 Safe Operation Area



Electrical Characteristics Curves

Fig. 13 Normalized Maximum Transient Thermal Impedance($Z_{\theta JC}$)

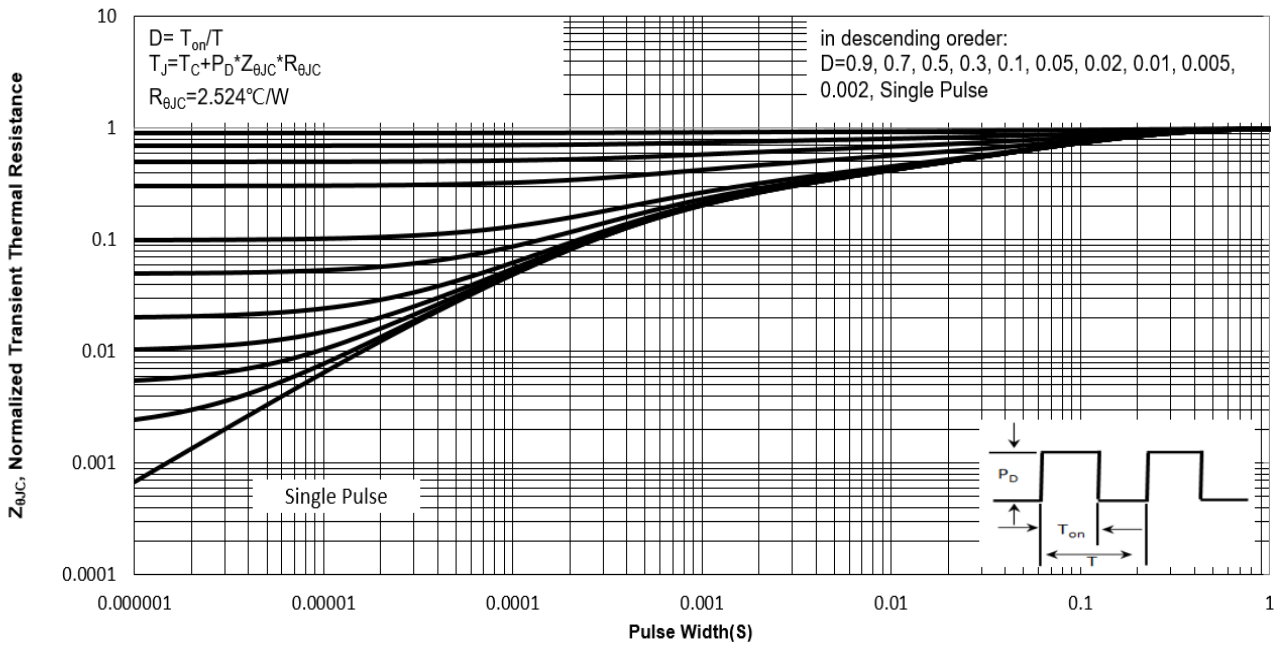
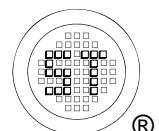
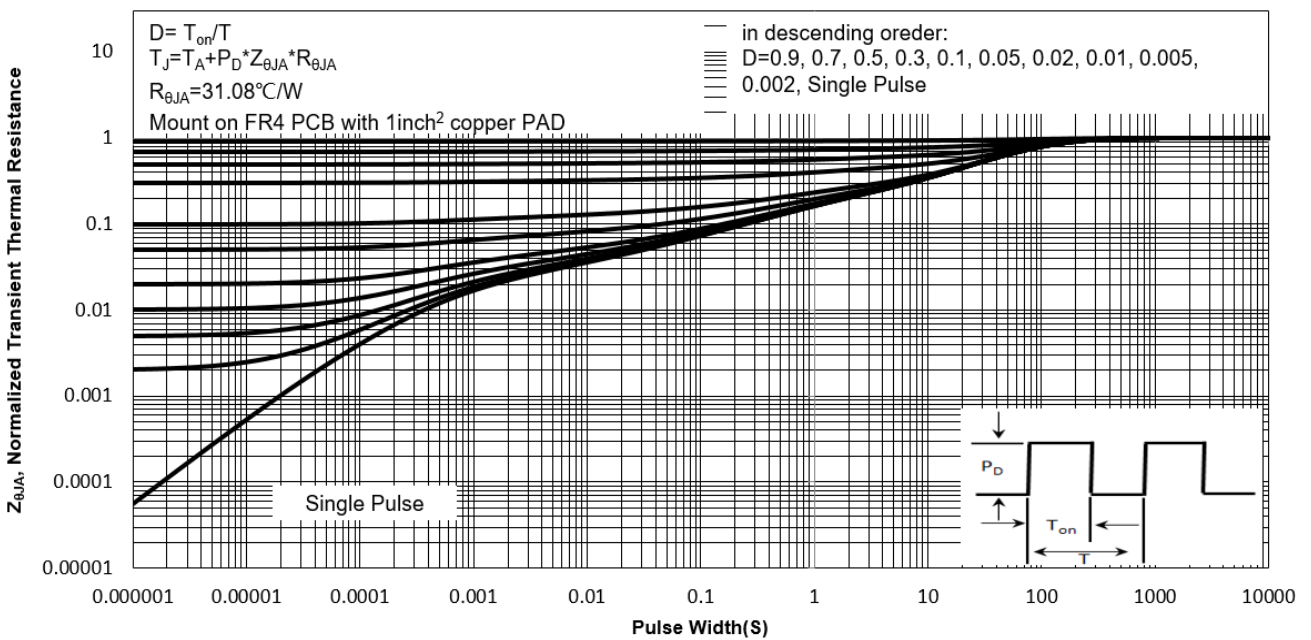


Fig. 14 Normalized Maximum Transient Thermal Impedance($Z_{\theta JA}$)



Test Circuits

Fig.1-1 Switching times test circuit

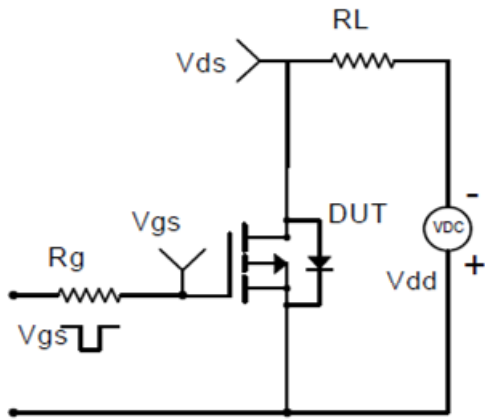


Fig.1-2 Switching Waveform

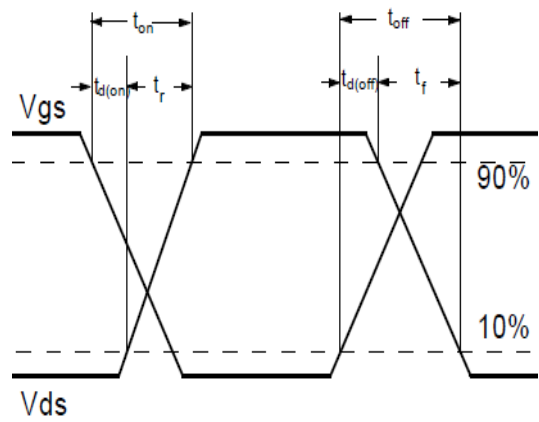


Fig.2-1 Gate charge test circuit

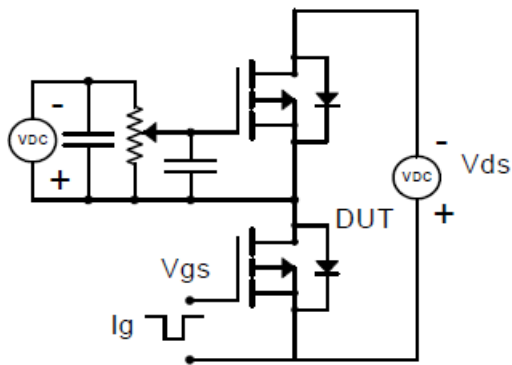


Fig.2-2 Gate charge waveform

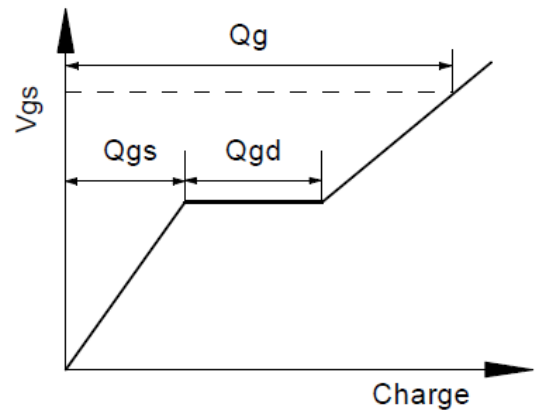


Fig.3-1 Avalanche test circuit

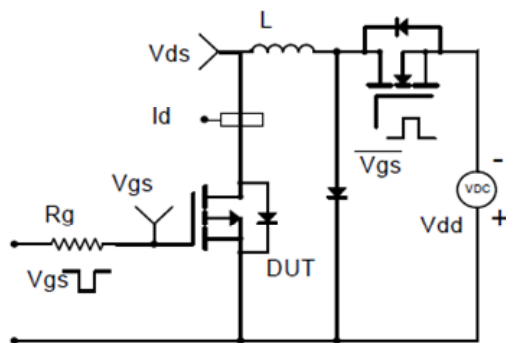
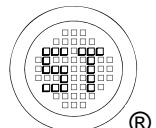
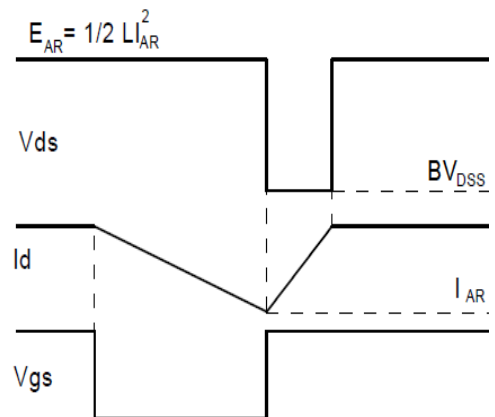


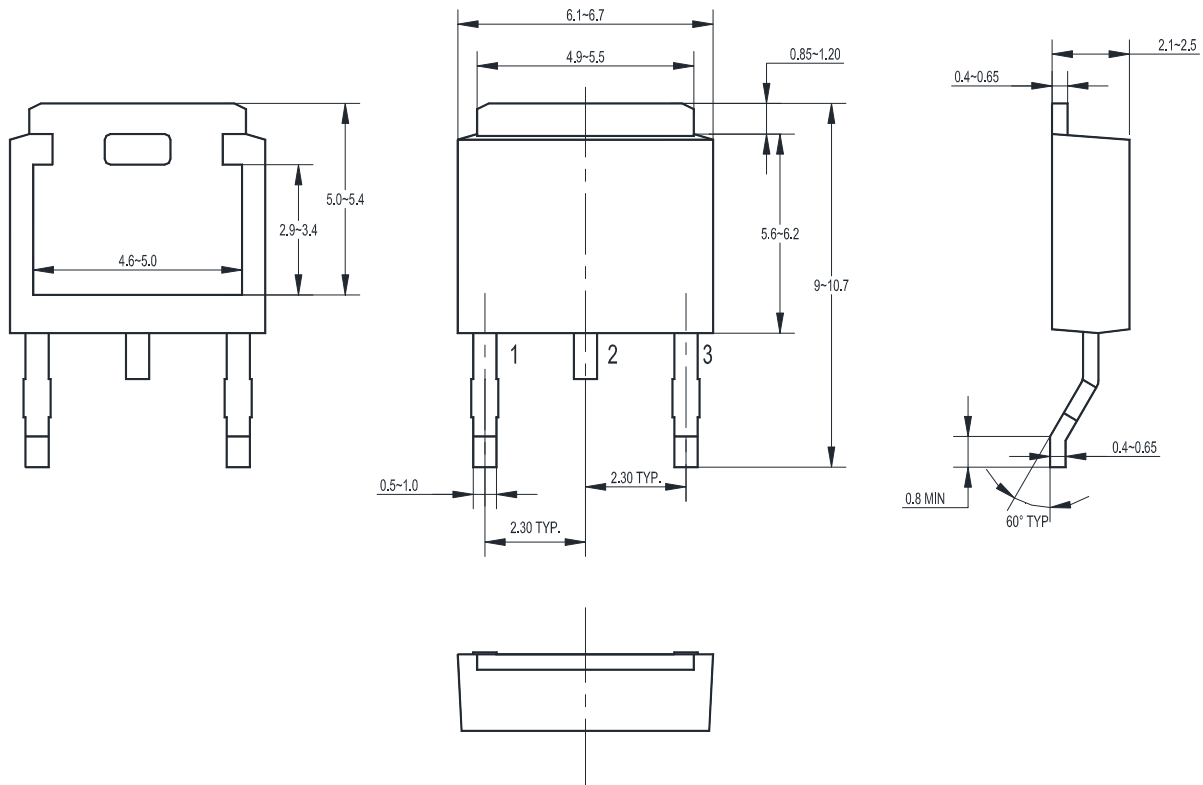
Fig.3-2 Avalanche waveform



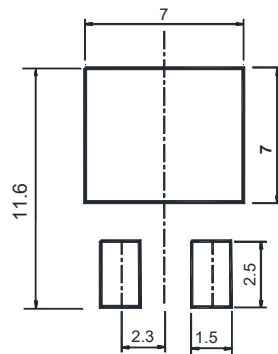
WTR02P100US-HAF

Package Outline (Dimensions in mm)

TO-252



Recommended Soldering Footprint



Packing information

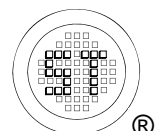
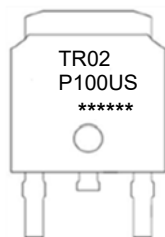
Package	Tape Width (mm)	Pitch		Reel Size		Per Reel Packing Quantity
		mm	inch	mm	inch	
TO-252	12	8 ± 0.1	0.315 ± 0.004	330	13	2,500

Marking information

" TR02P100US " = Part No.

" ***** " = Date Code Marking

Font type: Arial



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