

# WPV65N310-HAF

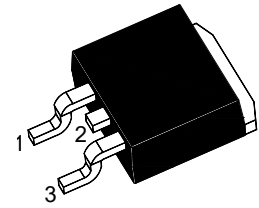
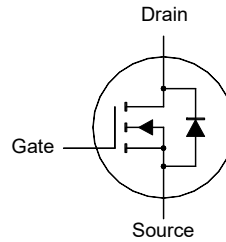
## N-Channel Enhancement Mode MOSFET

### Features

- Low  $R_{DS(on)}$
- Low Gate Charge
- Halogen and Antimony Free(HAF), RoHS compliant

### Application

- DC-DC converters
- Lighting
- Hard / Soft switching topology



1.Gate 2.Drain 3.Source  
TO-263 Plastic Package

### Key Parameters

Parameter	Value	Unit
$BV_{DSS}$	650	V
$R_{DS(ON) Max}$	310 @ $V_{GS} = 10 V$	m $\Omega$
$V_{GS(th) typ}$	3	V
$Q_g typ$	26 @ $V_{GS} = 10 V$	nC

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	650	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	V
Drain Current	$I_D$	8 5	A
		$T_c = 25^\circ C$ $T_c = 100^\circ C$	
Peak Drain Current, Pulsed <sup>1)</sup>	$I_{DM}$	35	A
Avalanche Current	$I_{AS}$	3.6	A
Single Pulse Avalanche Energy <sup>2)</sup>	$E_{AS}$	512	mJ
Power Dissipation	$P_D$	83	W
		$T_c = 25^\circ C$	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to + 150	$^\circ C$

### Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Case	$R_{\theta JC}$	1.5	$^\circ C/W$
Thermal Resistance from Junction to Ambient <sup>3)</sup>	$R_{\theta JA}$	30	$^\circ C/W$

<sup>1)</sup> Pulse Test: Pulse Width  $\leq 100 \mu s$ , Duty Cycle  $\leq 2\%$ , Repetitive rating, pulse width limited by junction temperature  $T_{J(MAX)} = 150^\circ C$ .

<sup>2)</sup> Limited by  $T_{J(MAX)}$ , starting  $T_J = 25^\circ C$ ,  $L = 79 mH$ ,  $R_g = 25 \Omega$ ,  $I_D = 3.6 A$ ,  $V_{GS} = 10 V$ .

<sup>3)</sup> Device Surface Mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate, in a still air.

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

Parameter	Symbol	Min.	Typ.	Max.	Unit
<b>STATIC PARAMETERS</b>					
Drain-Source Breakdown Voltage at $I_D = 250 \mu\text{A}$	$BV_{DSS}$	650	-	-	V
Drain-Source Leakage Current at $V_{DS} = 650 \text{V}$	$I_{DSS}$	-	-	1	$\mu\text{A}$
Gate Leakage Current at $V_{GS} = \pm 30 \text{V}$	$I_{GSS}$	-	-	$\pm 100$	nA
Gate-Source Threshold Voltage at $V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$	$V_{GS(th)}$	2	-	4	V
Drain-Source On-State Resistance at $V_{GS} = 10 \text{V}, I_D = 7 \text{A}$	$R_{DS(on)}$	-	272	310	m $\Omega$
<b>DYNAMIC PARAMETERS</b>					
Forward Transconductance at $V_{DS} = 5 \text{V}, I_D = 7 \text{A}$	$g_{fs}$	-	8	-	S
Gate Resistance at $V_{GS} = 0 \text{V}, V_{DS} = 0 \text{V}, f = 1\text{MHz}$	$R_g$	-	1.4	-	$\Omega$
Input Capacitance at $V_{GS} = 0 \text{V}, V_{DS} = 100 \text{V}, f = 1 \text{MHz}$	$C_{iss}$	-	826	-	pF
Output Capacitance at $V_{GS} = 0 \text{V}, V_{DS} = 100 \text{V}, f = 1 \text{MHz}$	$C_{oss}$	-	56	-	pF
Reverse Transfer Capacitance at $V_{GS} = 0 \text{V}, V_{DS} = 100 \text{V}, f = 1 \text{MHz}$	$C_{rss}$	-	7	-	pF
Gate charge total at $V_{DS} = 325 \text{V}, V_{GS} = 10 \text{V}, I_D = 7 \text{A}$	$Q_g$	-	26	-	nC
Gate to Source Charge at $V_{DS} = 325 \text{V}, V_{GS} = 10 \text{V}, I_D = 7 \text{A}$	$Q_{gs}$	-	5	-	nC
Gate to Drain Charge at $V_{DS} = 325 \text{V}, V_{GS} = 10 \text{V}, I_D = 7 \text{A}$	$Q_{gd}$	-	12	-	nC
Turn-On Delay Time at $V_{DS} = 325 \text{V}, V_{GS} = 10 \text{V}, I_D = 7 \text{A}, R_g = 24 \Omega$	$t_{d(on)}$	-	36	-	ns
Turn-On Rise Time at $V_{DS} = 325 \text{V}, V_{GS} = 10 \text{V}, I_D = 7 \text{A}, R_g = 24 \Omega$	$t_r$	-	19	-	ns
Turn-Off Delay Time at $V_{DS} = 325 \text{V}, V_{GS} = 10 \text{V}, I_D = 7 \text{A}, R_g = 24 \Omega$	$t_{d(off)}$	-	35	-	ns
Turn-Off Fall Time at $V_{DS} = 325 \text{V}, V_{GS} = 10 \text{V}, I_D = 7 \text{A}, R_g = 24 \Omega$	$t_f$	-	31	-	ns
<b>Body-Diode PARAMETERS</b>					
Drain-Source Diode Forward Voltage at $I_S = 7 \text{A}, V_{GS} = 0 \text{V}$	$V_{SD}$	-	-	1.4	V
Body-Diode Continuous Current	$I_S$	-	-	8	A
Body-Diode Continuous Current, Pulsed	$I_{SM}$	-	-	35	A
Body Diode Reverse Recovery Time at $I_S = 7 \text{A}, di/dt = 100 \text{A} / \mu\text{s}$	$t_{rr}$	-	293	-	ns
Body Diode Reverse Recovery Charge at $I_S = 7 \text{A}, di/dt = 100 \text{A} / \mu\text{s}$	$Q_{rr}$	-	3.7	-	$\mu\text{C}$

# WPV65N310-HAF

## Electrical Characteristics Curves

Fig. 1 Typical Output Characteristic

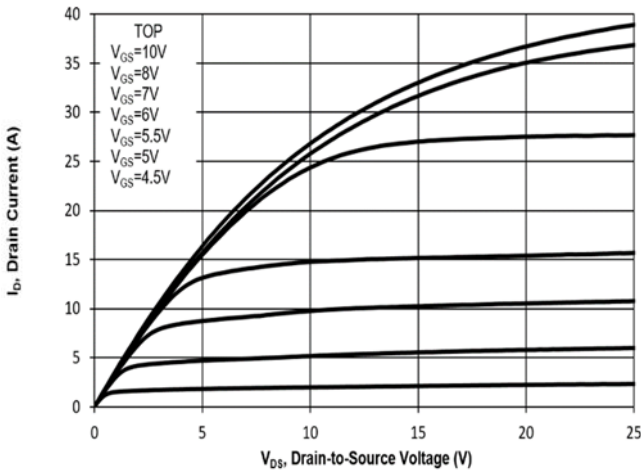


Fig. 2 Typical Transfer Characteristic

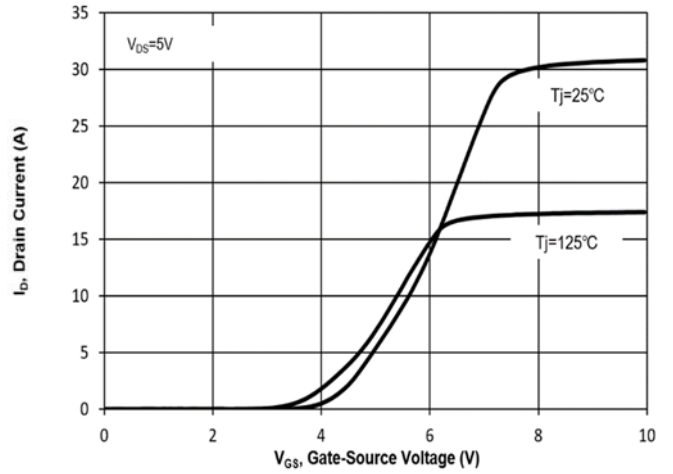


Fig. 3 On-Resistance vs. Drain Current

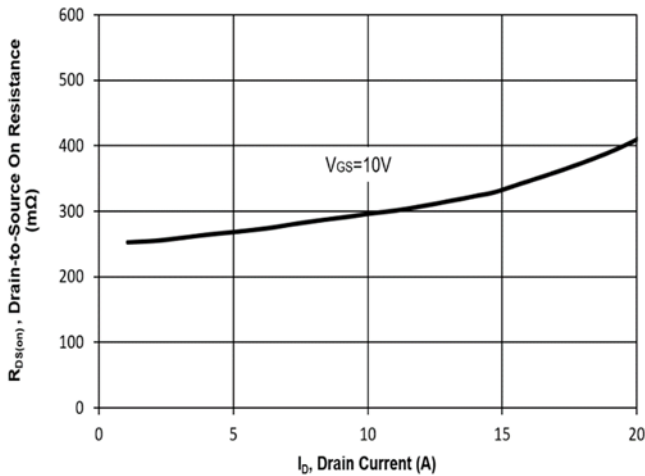


Fig. 4 On-Resistance vs. Gate Voltage

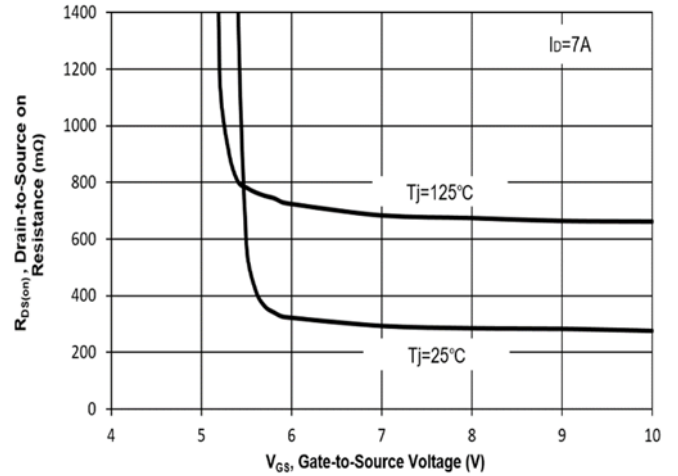


Fig. 5 On-Resistance vs. Tj

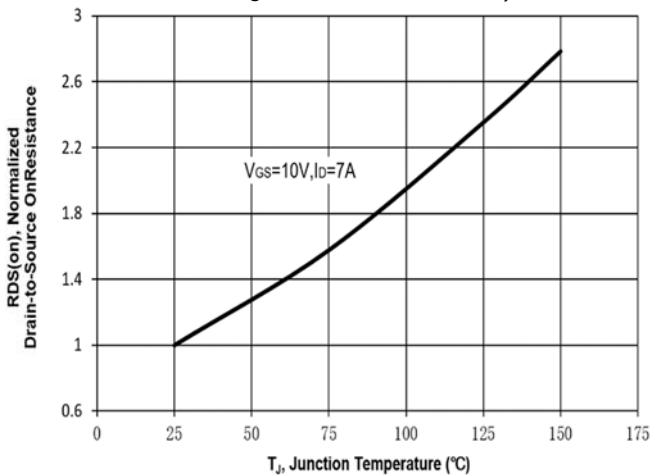
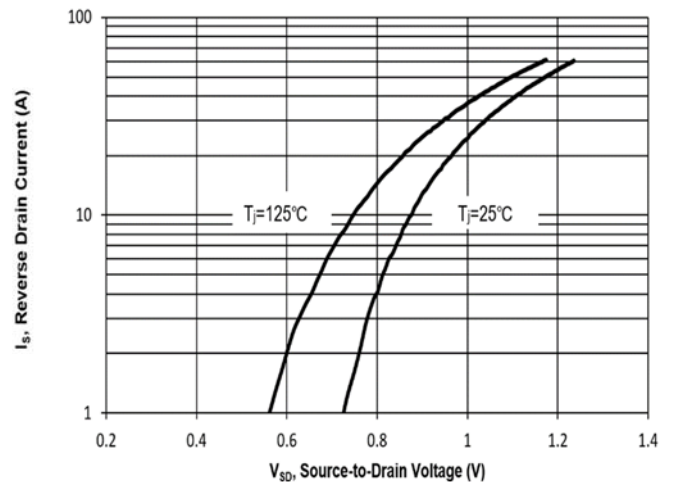


Fig. 6 Typical Forward Characteristic



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## Electrical Characteristics Curves

Fig. 7 Typical Junction Capacitance

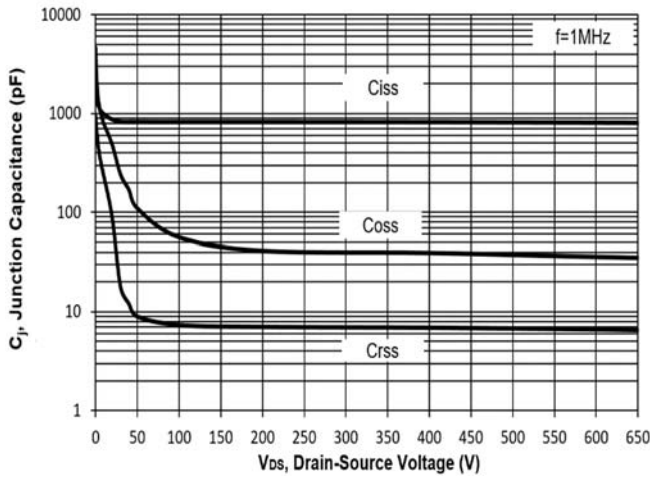


Fig. 8 Drain-Source Leakage Current vs. Tj

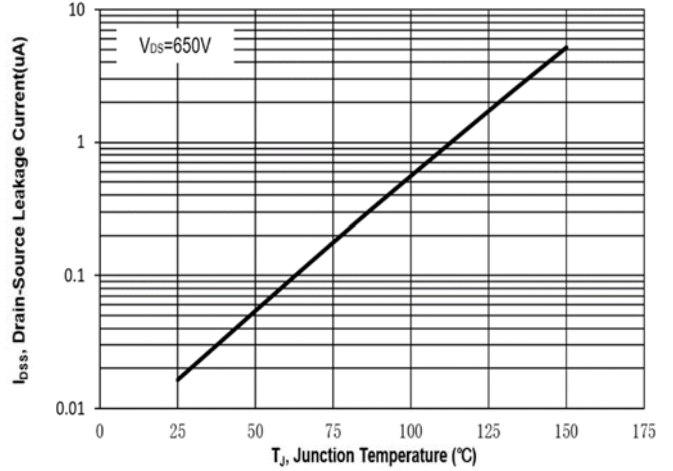


Fig. 9 V(BR)DSS vs. Junction Temperature

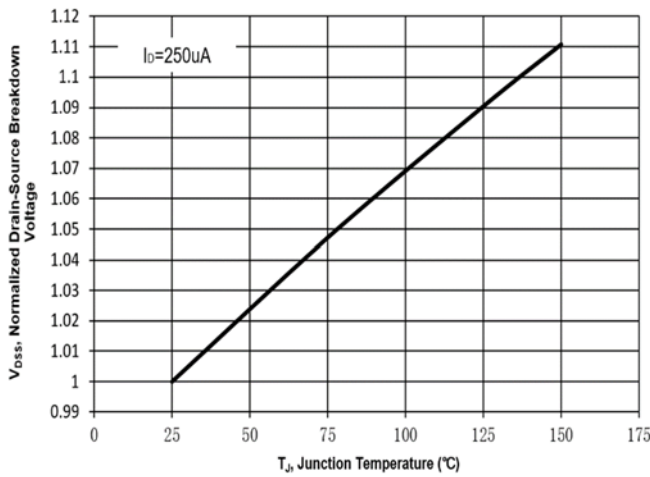


Fig. 10 Gate Threshold Variation vs. Tj

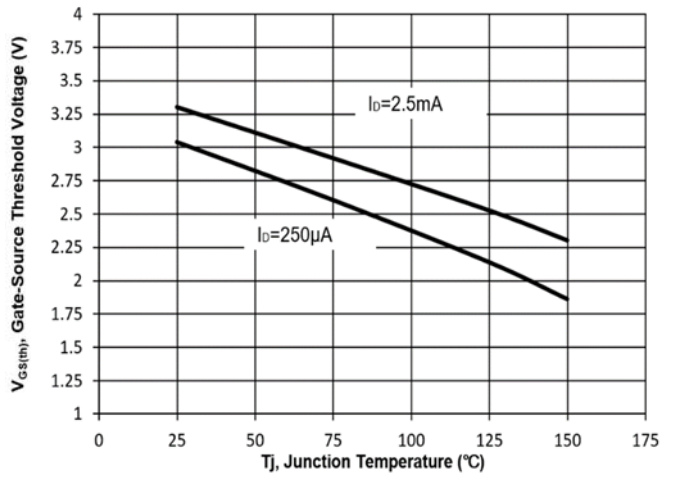


Fig. 11 Gate Charge

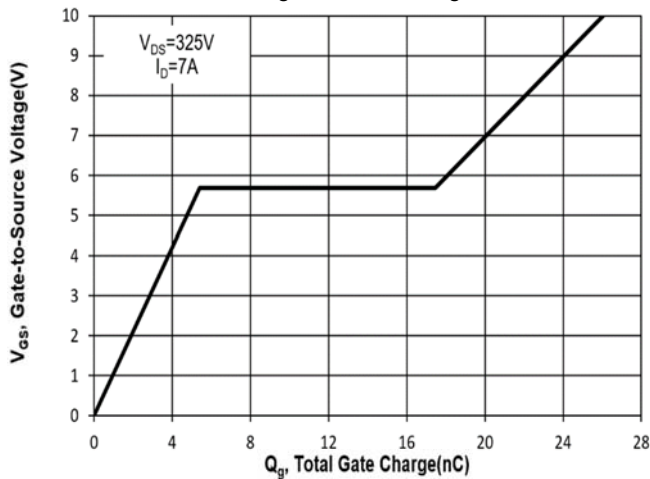
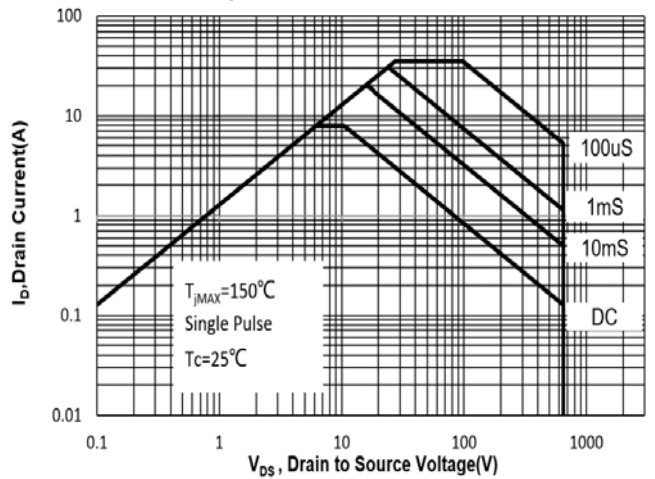


Fig. 12 Safe Operation Area



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## Electrical Characteristics Curves

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

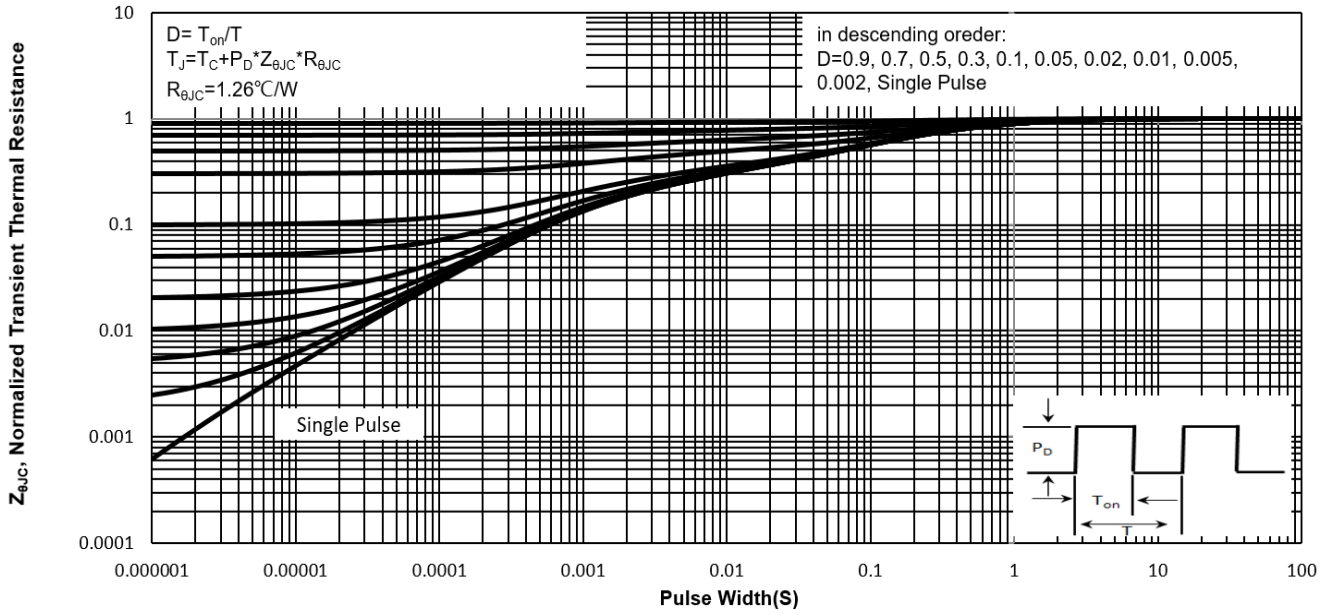
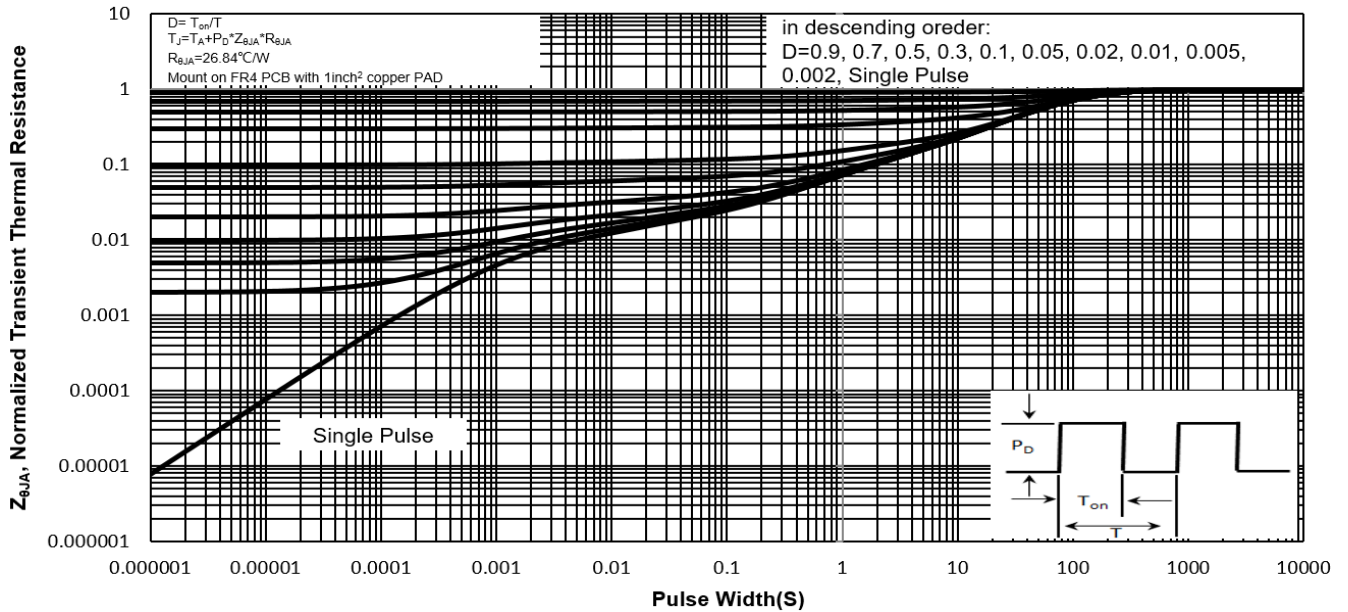


Fig.14 Normalized Maximum Transient Thermal Impedance( $Z_{\theta JA}$ )



## Test Circuits

Fig.1-1 Switching times test circuit

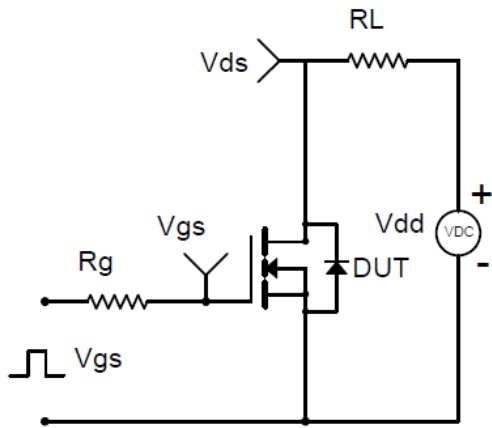


Fig.1-2 Switching Waveform

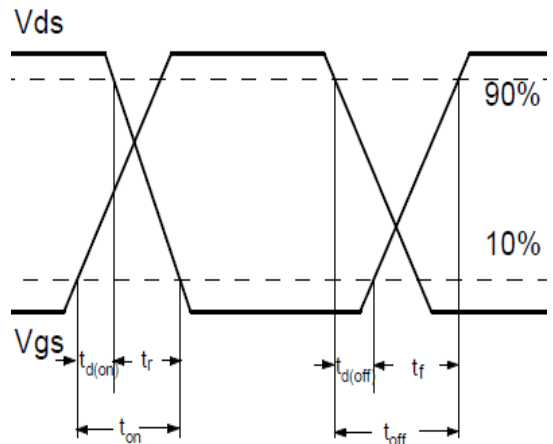


Fig.2-1 Gate charge test circuit

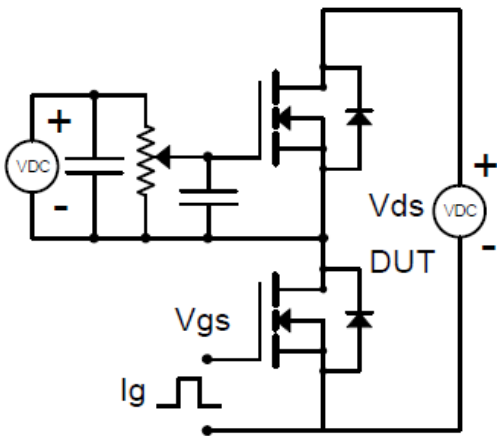


Fig.2-2 Gate charge waveform

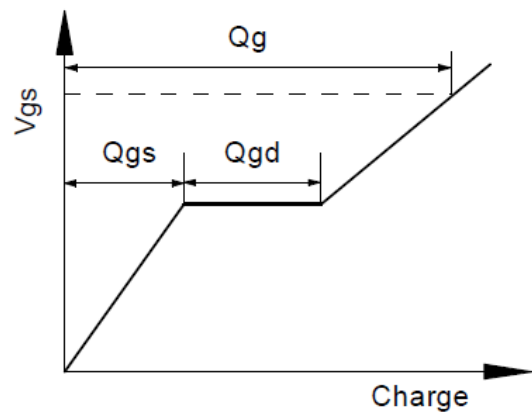


Fig.3-1 Avalanche test circuit

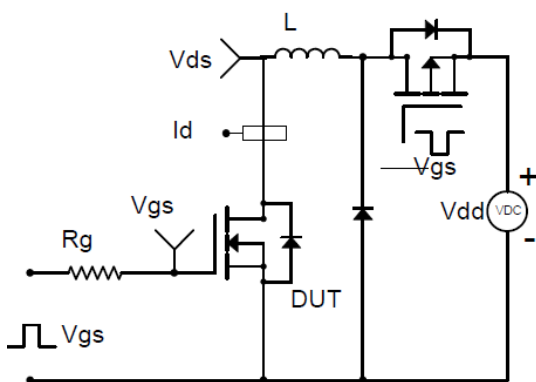
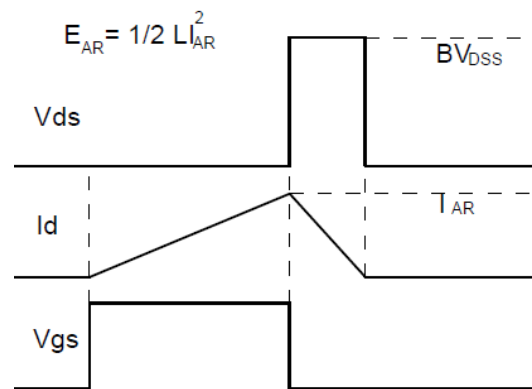


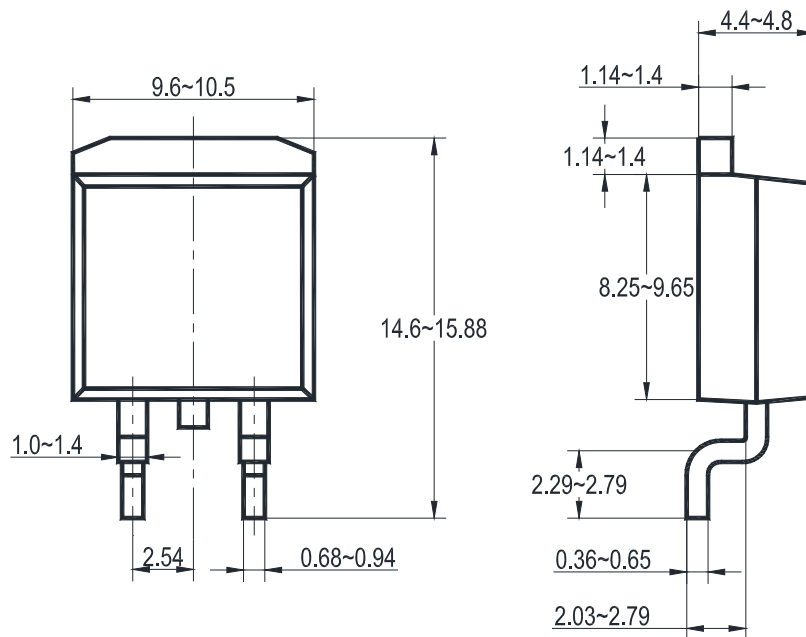
Fig.3-2 Avalanche waveform



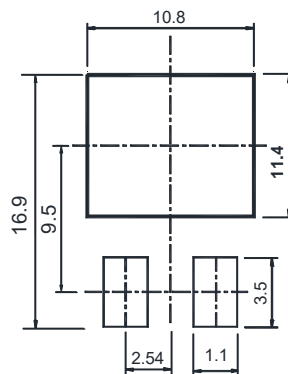
# WPV65N310-HAF

## Package Outline (Dimensions in mm)

TO-263



## Recommended Soldering Footprint



## Packing information

Package	Carton Quantity	Box Quantity	Base Quantity	Delivery Mode
TO-263	5 K / Carton	1 K / Box	50 pcs / Tube	Tube

## Marking information

" PV65N310 " = Part No.

" \*\*\*\*\* " = Date Code Marking

Font type: Arial



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