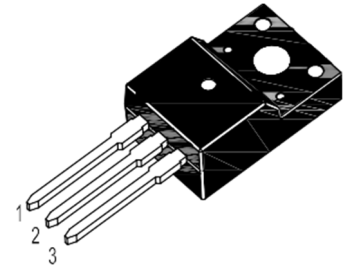
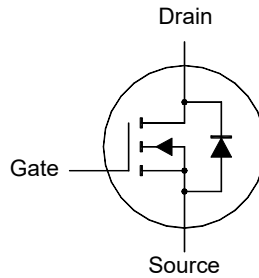


WDAT10N040LS-HAF

N-Channel Enhancement Mode MOSFET

Features

- Low $R_{DS(on)}$
- Low Miller Capacitance
- Fully Characterized Capacitance and Avalanche
- Halogen and Antimony Free(HAF), RoHS compliant



1.Gate 2.Drain 3.Source
TO-220F Plastic Package

Application

- BLDC Motor drive applications
- Battery powered circuits
- Synchronous rectifier applications
- Resonant mode power supplies

Key Parameters

Parameter	Value	Unit
BV_{DSS}	100	V
$R_{DS(ON)}$ Max	4.8 @ $V_{GS} = 10$ V	m Ω
	6.3 @ $V_{GS} = 4.5$ V	
$V_{GS(th)}$ typ	1.7	V
Q_g typ	75 @ $V_{GS} = 10$ V	nC

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

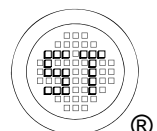
Parameter	Symbol	Value	Unit	
Drain-Source Voltage	V_{DS}	100	V	
Gate-Source Voltage	V_{GS}	± 20	V	
Continuous Drain Current	I_D	$T_c = 25^\circ\text{C}$	57	A
		$T_c = 100^\circ\text{C}$	36	
Peak Drain Current, Pulsed ¹⁾	I_{DM}	400	A	
Avalanche Current	I_{AS}	24	A	
Single Pulse Avalanche Energy ²⁾	E_{AS}	144	mJ	
Power Dissipation	P_D	27.2	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	$R_{\theta JC}$	4.6	$^\circ\text{C/W}$
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	43	$^\circ\text{C/W}$

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

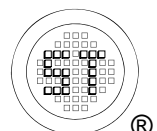
²⁾ Limited by $T_{J(MAX)}$, starting $T_J = 25^\circ\text{C}$, $L = 0.5$ mH, $R_g = 25$ Ω , $I_D = 24$ A, $V_{GS} = 10$ V.



WDAT10N040LS-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}	100	-	-	V
Drain-Source Leakage Current at $V_{DS} = 100 \text{ V}$	I_{DSS}	-	-	1	μA
Gate Leakage Current at $V_{GS} = \pm 20 \text{ V}$	I_{GSS}	-	-	± 100	nA
Gate-Source Threshold Voltage at $V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$	$V_{GS(th)}$	1.2	-	2.4	V
Drain-Source On-State Resistance at $V_{GS} = 10 \text{ V}, I_D = 50 \text{ A}$ at $V_{GS} = 4.5 \text{ V}, I_D = 20 \text{ A}$	$R_{DS(on)}$	- -	3.8 -	4.8 6.3	$\text{m}\Omega$
DYNAMIC PARAMETERS					
Forward Transconductance at $V_{DS} = 5 \text{ V}, I_D = 30 \text{ A}$	g_{fs}	-	104	-	S
Gate Resistance at $V_{GS} = 0 \text{ V}, V_{DS} = 0 \text{ V}, f = 1 \text{ MHz}$	R_g	-	1	-	Ω
Input Capacitance at $V_{GS} = 0 \text{ V}, V_{DS} = 50 \text{ V}, f = 1 \text{ MHz}$	C_{iss}	-	3742	-	pF
Output Capacitance at $V_{GS} = 0 \text{ V}, V_{DS} = 50 \text{ V}, f = 1 \text{ MHz}$	C_{oss}	-	698	-	pF
Reverse Transfer Capacitance at $V_{GS} = 0 \text{ V}, V_{DS} = 50 \text{ V}, f = 1 \text{ MHz}$	C_{rss}	-	34	-	pF
Gate charge total at $V_{DS} = 50 \text{ V}, I_D = 50 \text{ A}, V_{GS} = 10 \text{ V}$ at $V_{DS} = 50 \text{ V}, I_D = 50 \text{ A}, V_{GS} = 4.5 \text{ V}$	Q_g	- -	75 40	- -	nC
Gate to Source Charge at $V_{DS} = 50 \text{ V}, I_D = 50 \text{ A}, V_{GS} = 10 \text{ V}$	Q_{gs}	-	14	-	nC
Gate to Drain Charge at $V_{DS} = 50 \text{ V}, I_D = 50 \text{ A}, V_{GS} = 10 \text{ V}$	Q_{gd}	-	22	-	nC
Turn-On Delay Time at $V_{DS} = 50 \text{ V}, I_D = 50 \text{ A}, V_{GS} = 10 \text{ V}, R_g = 3.3 \Omega$	$t_{d(on)}$	-	26	-	nS
Turn-On Rise Time at $V_{DS} = 50 \text{ V}, I_D = 50 \text{ A}, V_{GS} = 10 \text{ V}, R_g = 3.3 \Omega$	t_r	-	43	-	nS
Turn-Off Delay Time at $V_{DS} = 50 \text{ V}, I_D = 50 \text{ A}, V_{GS} = 10 \text{ V}, R_g = 3.3 \Omega$	$t_{d(off)}$	-	23	-	nS
Turn-Off Fall Time at $V_{DS} = 50 \text{ V}, I_D = 50 \text{ A}, V_{GS} = 10 \text{ V}, R_g = 3.3 \Omega$	t_f	-	8	-	nS
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at $I_s = 1 \text{ A}, V_{GS} = 0 \text{ V}$	V_{SD}	-	-	1.3	V
Body-Diode Continuous Current	I_s	-	-	57	A
Body-Diode Continuous Current, Pulsed	I_{SM}	-	-	400	A
Body Diode Reverse Recovery Time at $I_s = 50 \text{ A}, V_{DD} = 50 \text{ V}, di/dt = 200 \text{ A} / \mu\text{s}$	t_{rr}	-	48	-	nS
Body Diode Reverse Recovery Charge at $I_s = 50 \text{ A}, V_{DD} = 50 \text{ V}, di/dt = 200 \text{ A} / \mu\text{s}$	Q_{rr}	-	106	-	nC



Electrical Characteristics Curves

Fig. 1 Typical Output Characteristics

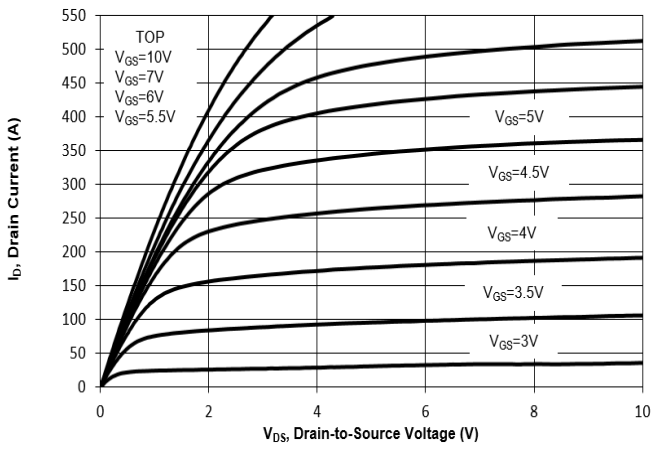


Fig. 2 Typical Transfer Characteristics

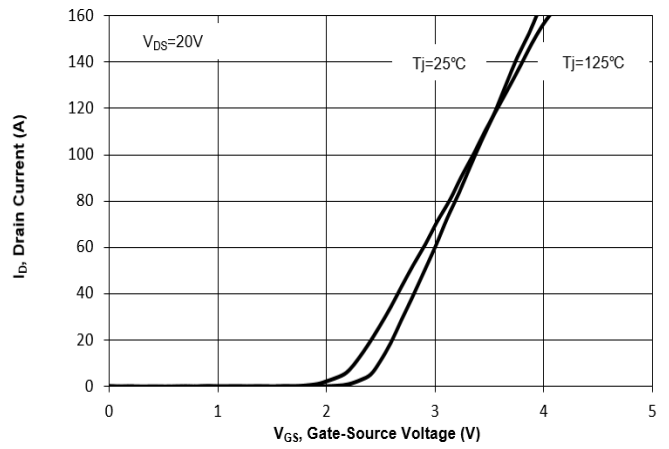


Fig. 3 On-Resistance vs. Drain Current

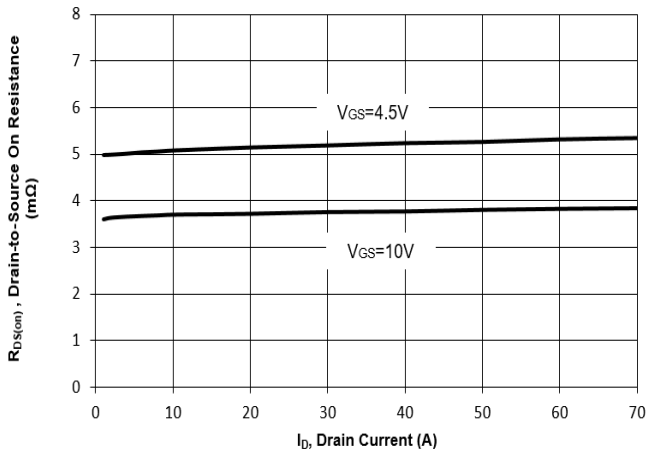


Fig. 4 On-Resistance vs. Gate Voltage

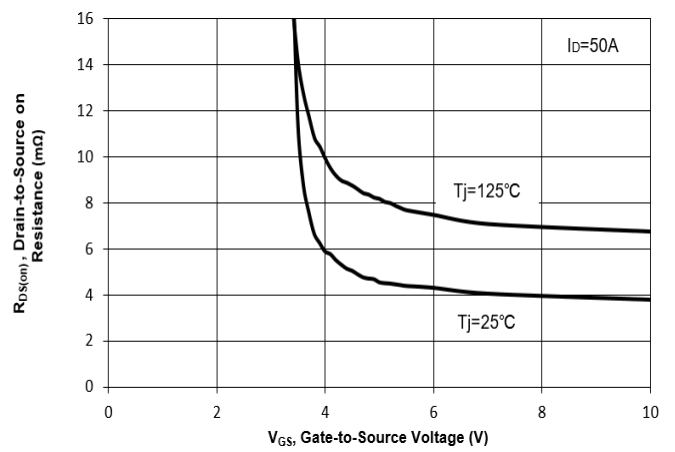


Fig. 5 On-Resistance vs. T_J

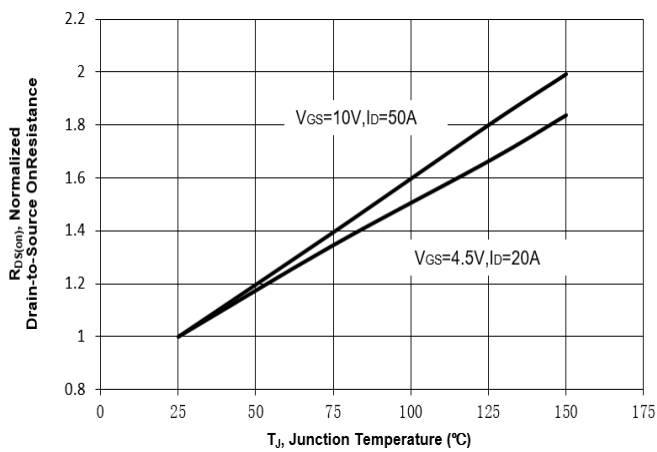
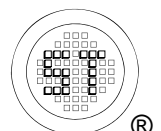
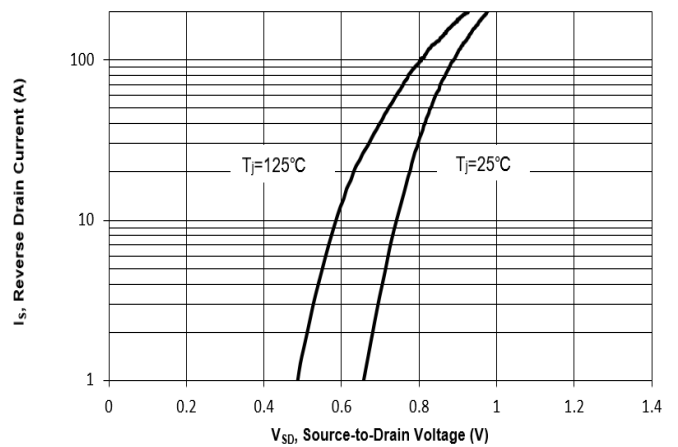


Fig. 6 Typical Body-Diode Forward Characteristics



Electrical Characteristics Curves

Fig. 7 Typical Junction Capacitance

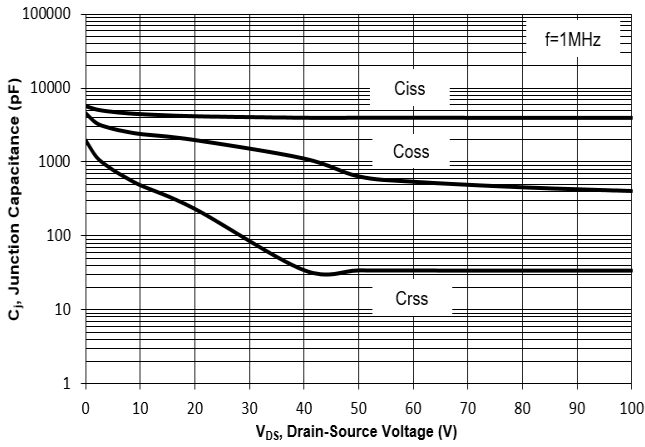


Fig. 8 Drain-Source Leakage Current vs. Tj

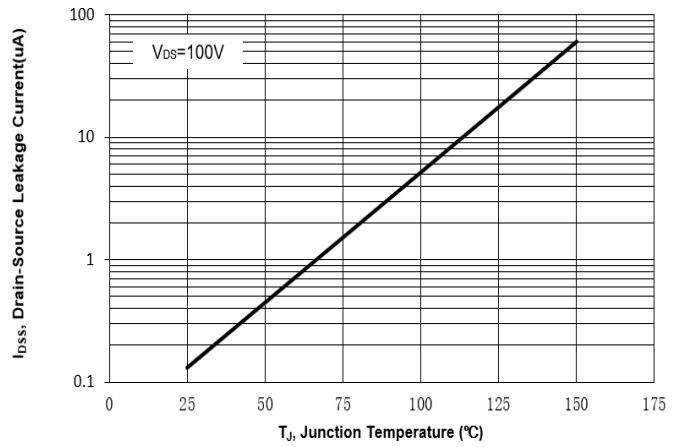


Fig. 9 V(BR)DSS vs. Junction Temperature

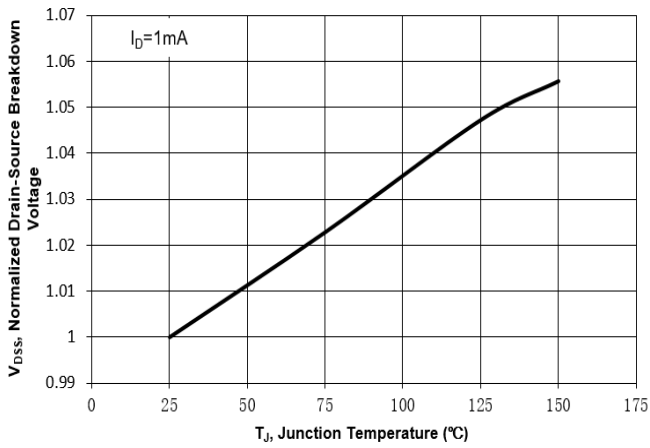


Fig. 10 Gate Threshold Variation vs. Tj

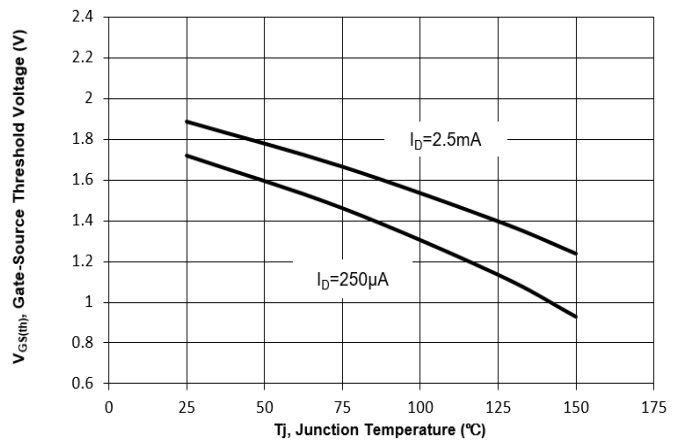


Fig. 11 Gate Charge

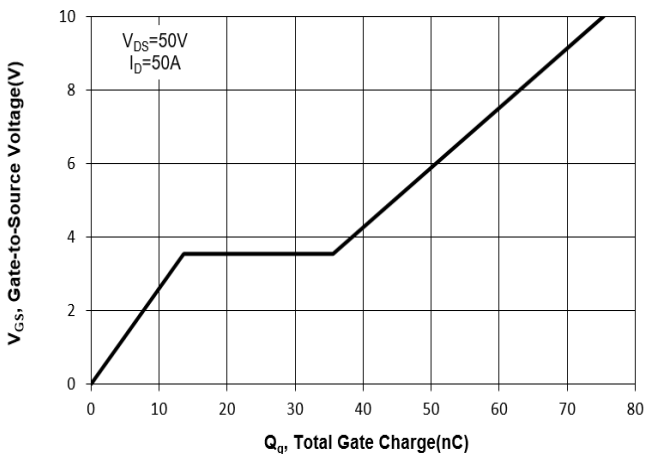
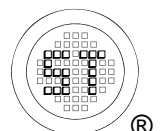
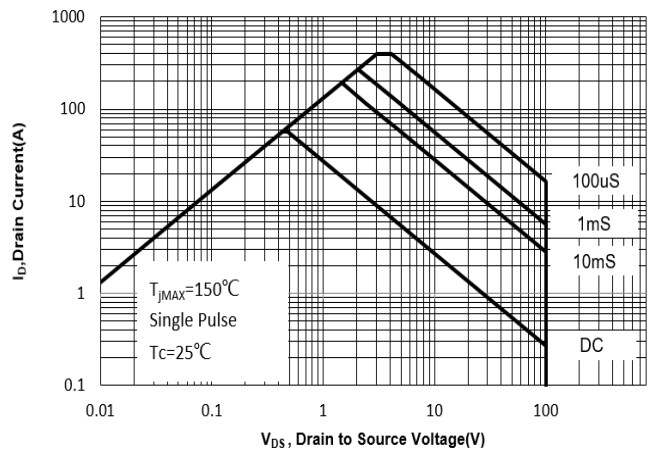


Fig. 12 Safe Operation Area



Electrical Characteristics Curves

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

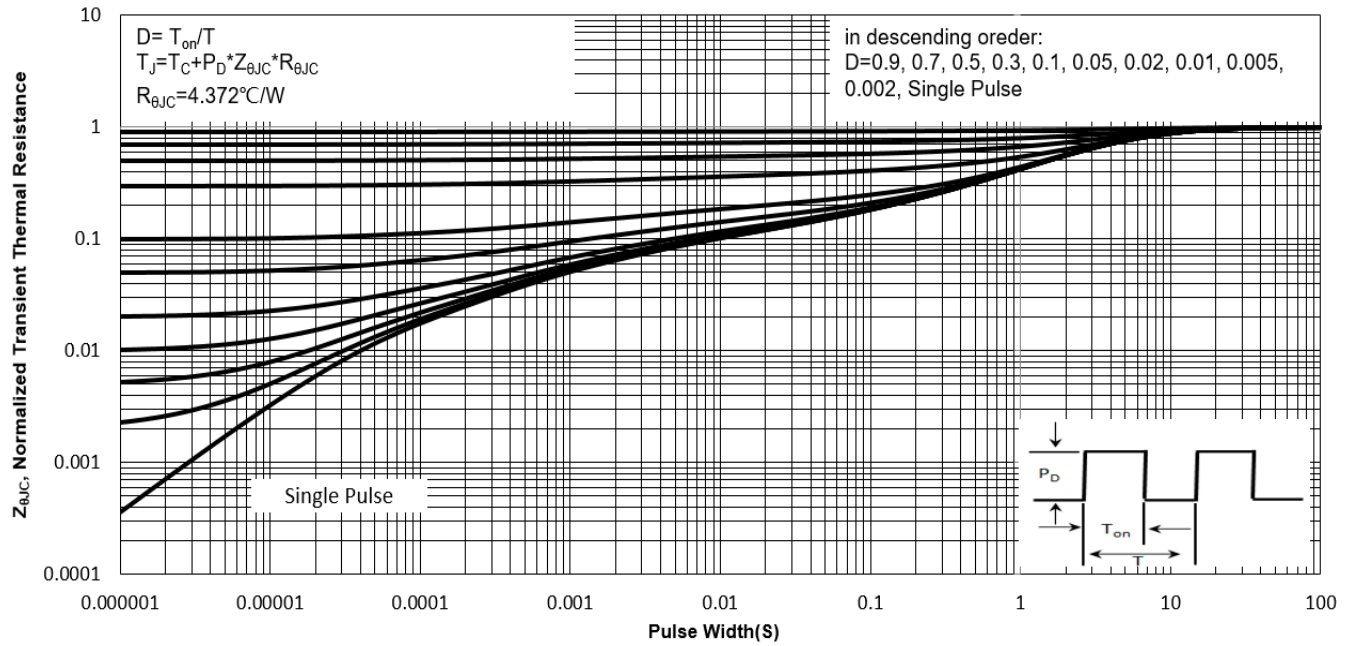
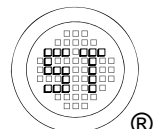
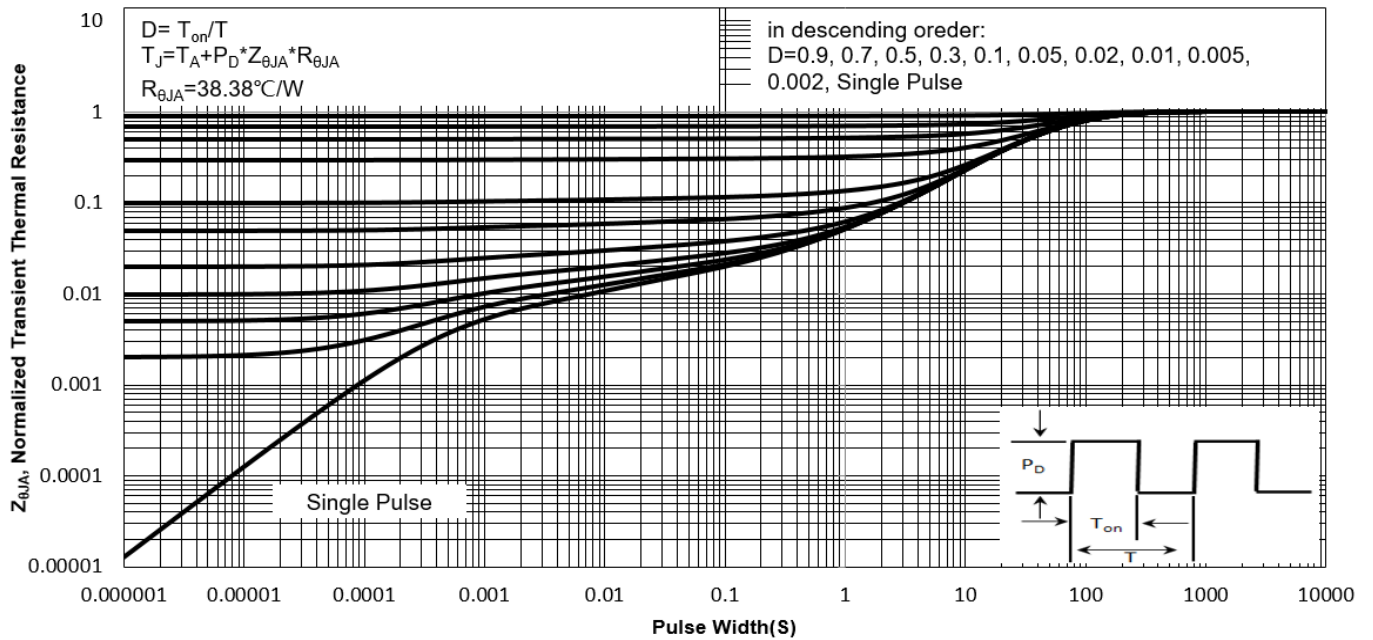


Fig. 14 Normalized Maximum Transient Thermal Impedance($z_{\theta JA}$)



WDAT10N040LS-HAF

Test Circuits

Fig.1-1 Switching times test circuit

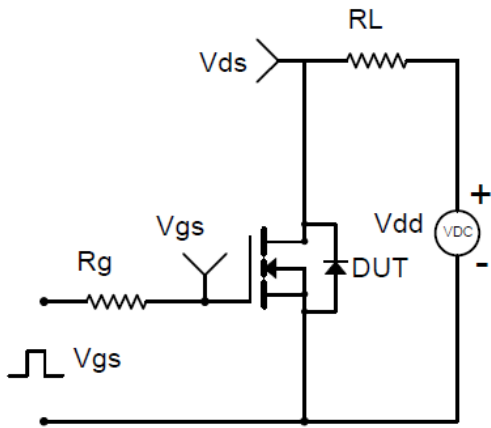


Fig.1-2 Switching Waveform

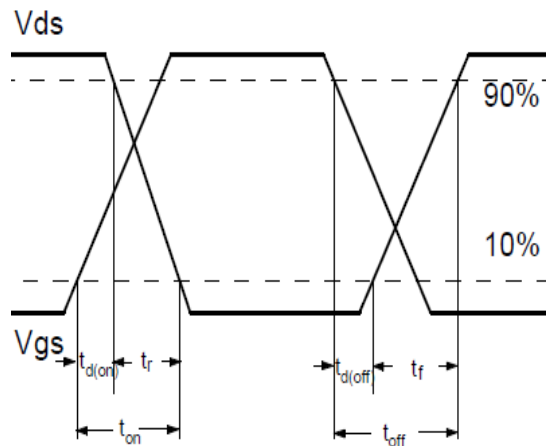


Fig.2-1 Gate charge test circuit

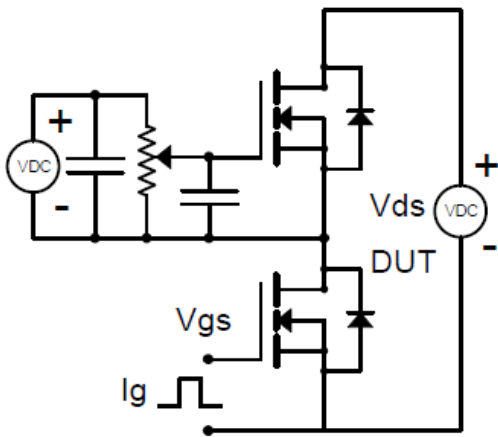


Fig.2-2 Gate charge waveform

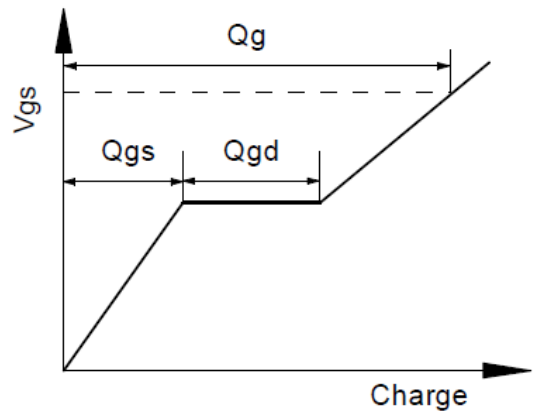


Fig.3-1 Avalanche test circuit

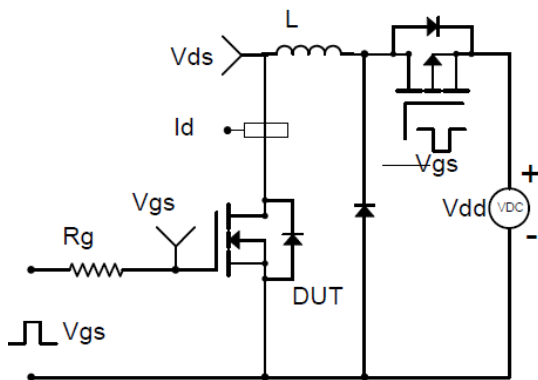
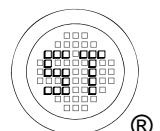
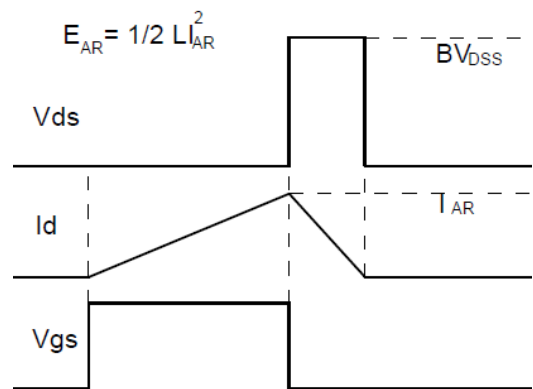


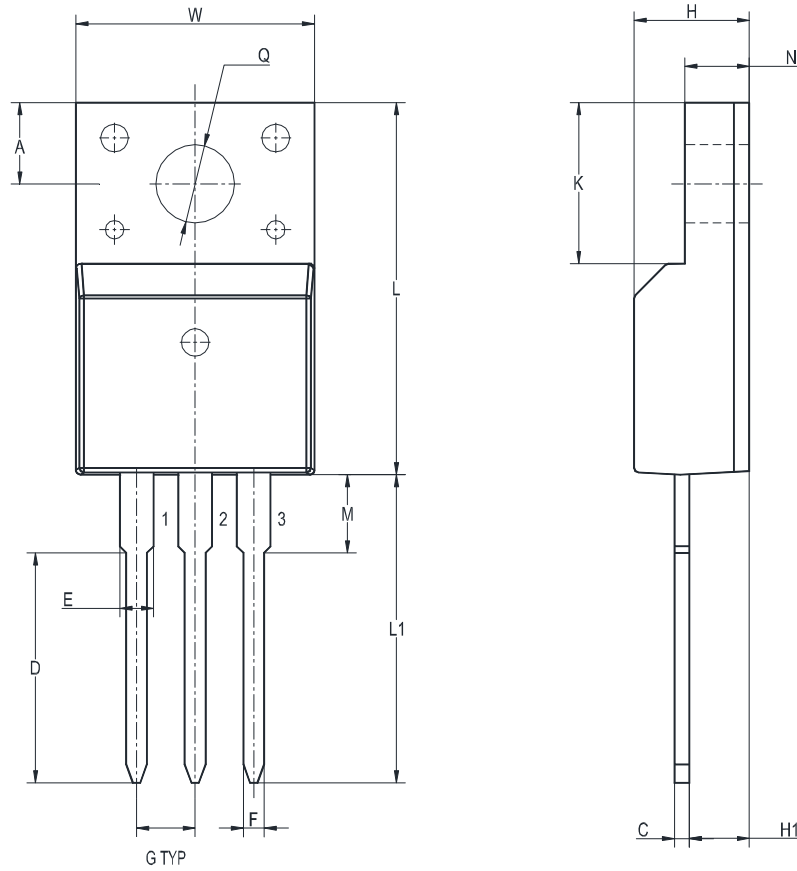
Fig.3-2 Avalanche waveform



WDAT10N040LS-HAF

Package Outline Dimensions (Units: mm)

TO-220F



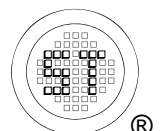
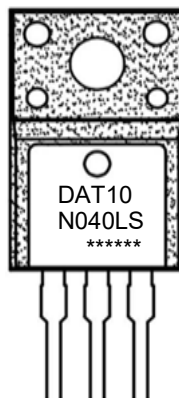
UNIT	A	C	D	E	F	G	W	H	H1	Q	L	L1	M	K	N
mm	3.5	0.7	10.3	1.5	0.9	2.54	10.5	4.9	2.9	3.4	16	13.5	3.5	6.7	2.8
	2.8	0.4	9.7	1.1	0.7	TYP.	9.5	4.5	2.5	2.9	15	12.5	2.9	6.2	2.3

Marking information

" DAT10N040LS " = Part No.

" ***** " = Date Code Marking

Font type: Arial



IMPORTANT NOTICE

Our company and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes to improve product design, functions and reliability without further notice to this document and any product described herein.

Statements described herein regarding the reliability and suitability of products is for illustrative purposes only. Products specifically described herein are not authorized for use as critical components in life support devices, automobile, military, aviation or aerospace only with the written approval of our company.

The information contained herein is presented only as guidance for product use. No license to any intellectual property rights is granted under this document. No responsibility is assumed by our company for any infringement of patents or any other intellectual property rights of third party that may result from the use of the product.

